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# Reconstructing a lute by Sixtus Rauwolf

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Doctor of Philosophy in Music

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## **Declaration**

I declare that this thesis submitted for the degree of Doctor of Philosophy in Music is entirely my own work, written and researched for the purpose of this degree, and has not been submitted for any other degree or professional qualification.

Jonathan Santa Maria Bouquet

24 February 2017.





## **Abstract and lay summary**

The focus of this project is to reconstruct a lute as originally made by Sixtus Rauwolf. Rauwolf was a lute maker active in Augsburg from 1577 until ca.1625; only six of his lutes are known at the present time, and all of them have been altered to keep up with musical trends throughout the last four centuries. These six instruments encompass the entire extant corpus of the lute making tradition of the late Renaissance in Augsburg.

The reconstruction of this lute strives to achieve a conceivable historical correctness. Yet, without any Rauwolf lute in original condition available, or any other lute made in the same city as a means of comparison, and due to the lack of tangible evidence of how he conceived and constructed his instruments, the enterprise of reconstructing an archetypal Rauwolf lute in its intended shape and style is essentially a combination of historical research and creative process.

To understand Sixtus Rauwolf and his work, part of this research aimed to gather biographical, archival and published material, as well as an in-depth study of the documentation of the known extant lutes by Rauwolf held in public and private collections: The Metropolitan Museum of Art in New York, Musikmuseet in Copenhagen, The Fugger Museum in Babenhausen, Scenkonstmuseet in Stockholm, and two more in private collections in London. In addition, the research process is solidly based on a thorough study of the lute, its characteristics and construction, during the late Renaissance in Europe through printed music and treatises, iconography, and the extant lutes of that period. Nevertheless, none of these resources suffice individually; the separate pieces of information gathered through research underwent a cross examination, and the unanswered questions were solved by means of a creative process reliant also in lute-making experience and ergonomics. The final result of this project is materialized in the construction of a fully functional lute, as newly-made by Sixtus Rauwolf.



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## Parts of the lute

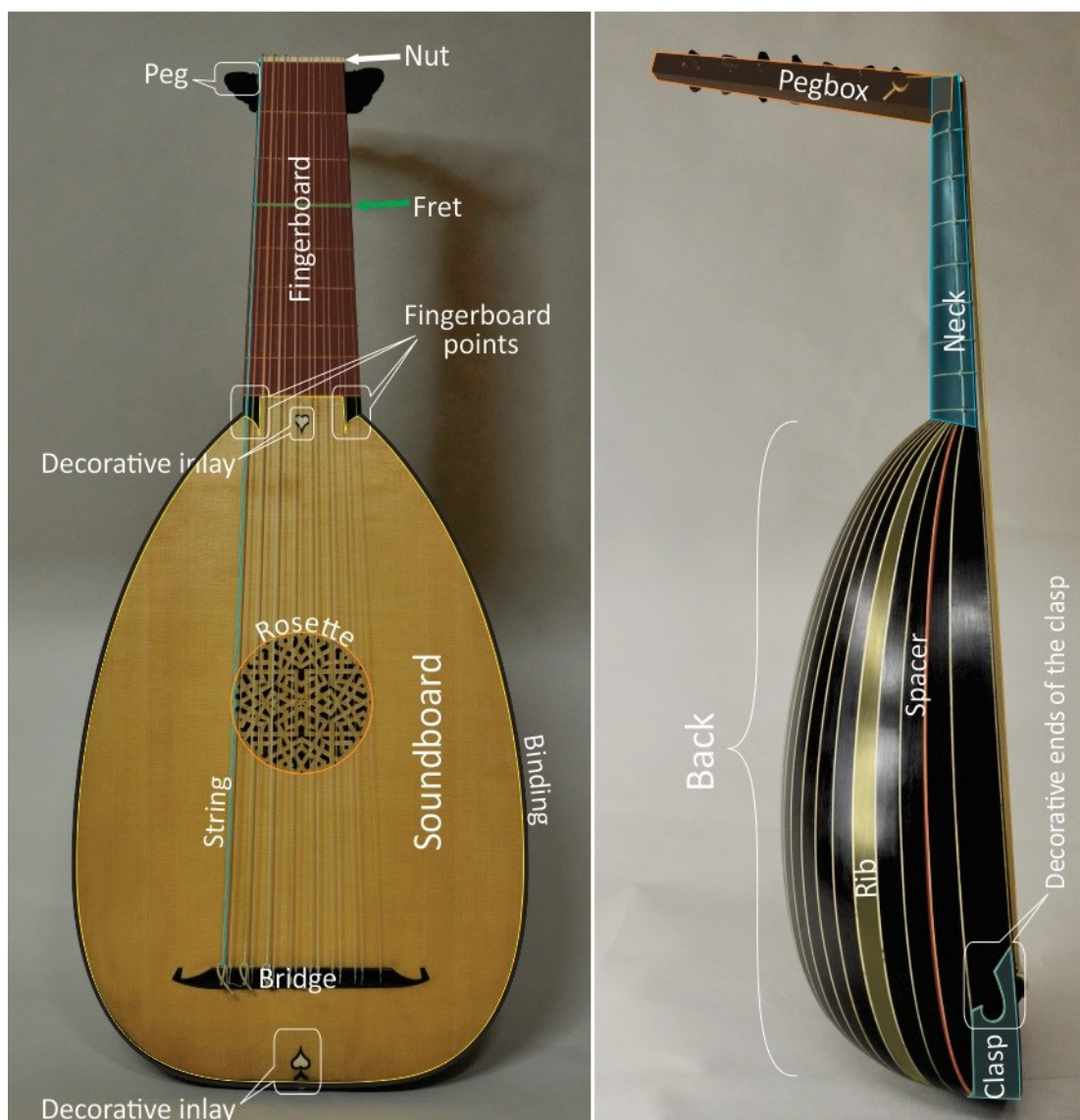


Figure 1. Diagram of the parts of the lute.



“That strange object the tool of music, a machine or technical contraption serving an art and often itself a work of art, pleasing the eye as well as the ear.”

Emanuel Winternitz.





## **Introduction**

Part experimental archaeology, part reverse engineering, this creative practice PhD project aims to physically build a plausible reconstruction of a lute as originally made by Sixtus Rauwolf. As such, this thesis is only a partial outcome of the research carried out.

Sixtus Rauwolf was a lute maker active in the Imperial city of Augsburg from 1577 until ca.1625. Notwithstanding his rather long active career, only six of his lutes are known to be extant at the present time, and all of them have been modified and altered to keep up with musical trends and needs throughout the last four centuries. Although Augsburg is known to have had a number of active lute makers working at the time, these six instruments encompass the entire extant corpus of the lute making tradition of the late Renaissance in Augsburg.

The expected outcome of this project, is the reconstruction of an archetypical lute by Rauwolf of conceivable historical correctness rather than the faithful reproduction of a specific instrument. Yet, without any extant lute by Rauwolf in original condition, or any other lute made in the same city during the same period as a mean of comparison, and due to the lack of tangible evidence of how he conceived and constructed his instruments, the reconstructed lute will be based on the information gathered through the cross-examination of all his remaining lutes and the historical evidence found in original sources. Consequently this exercise of experimental archaeology will be the result of a combination of historical research and a creative process.

The written part of this project covers three key aspects; firstly an in-depth research of the lute during the late-Renaissance in Europe, with particular emphasis on its physical characteristics, construction techniques, and the materials employed for its construction. This was achieved though the cross-examination of previously published material, iconography, the extant lutes of

the period, and historical written sources, mainly printed music and music treatises.

Secondly, a biography of Sixtus Rauwolf based on original archival records and previously published material. This includes a thorough revision of Rauwolf's work, including a detailed analysis, documentation, and description of all the known extant instruments made by Rauwolf, followed by a cross-examination of the physical characteristics, construction techniques, and aesthetical elements.

Finally, a step-by-step account of the thought process – both as a creative and a research endeavour – to approach a plausible reconstruction. This begins with the conceptualization of the lute as an amalgamation of pieces of information coalescing in the creation of a technical drawing, and concludes with a detailed step-by-step description of the physical construction of a historically plausible lute as originally conceived by Sixtus Rauwolf.

There are many pathways towards the construction of a lute, although most commonly they can be divided into three distinctive approaches: copying or reproducing, reinterpreting, and reconstructing.

Copying involves making a reproduction of a historical instrument as close as possible to its current state, replicating not only its physical characteristics, but also the previous modifications that led to the instrument that exists today. This is the most common approach taken by violin makers for the last two centuries; the great majority of whom copied instruments made by Stradivari or Guarneri, which have been modified over the last three hundred years.

Reinterpreting involves reinventing or redefining an instrument based on available sources whilst mixing modern construction techniques and ideas, hence modifying the original instrument. This approach often aims to 'improve' the original instrument by making it louder, or more stable, improving its tuning, etc. or to expedite the construction process to generate

cheaper instruments. On the other hand, reinterpretation can be simply the result of the lack of knowledge and misinformation. This was a widespread tendency during the twentieth century, by instrument makers like Arnold Dolmetsch and Herman Hauser.<sup>1</sup>

A reconstruction involves a degree of research into what a specific maker intended in the first place, or how an instrument was originally made in a certain place and time. Certainly not all reproductions are undertaken to the same depth of study, as often the intention is not to achieve a thorough historical accuracy but to produce a plausible instrument of a general time and period. Before embarking in this project, the author produced a lute loosely based on one of Rauwolf's instruments, obtaining widely different results from the one produced after this extensive research.

Most lutes made during the Renaissance have been modified through time to keep up with musical trends and to remain functional, therefore, their reconstruction often involves acquiring information and evidence from a variety of sources from a specific period, geographical area, and/or a specific maker or school; namely: iconographical, musical, and physical evidence. However, none of these historical resources will suffice individually to provide a satisfactory outcome; the separate pieces of information gathered from primary sources have to be submitted to thorough cross-examination, and the results of this process will eventually provide answers to specific questions.

This project aims to achieve a historically accurate reconstruction of a lute by Sixtus Rauwolf. The final result, the reconstructed lute, will not be dependent exclusively on historical research, but will be formed by a creative process in

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<sup>1</sup> Both instrument makers and their practice will be discussed further on.

which the gathered data is combined and interpreted in the hypothetical mind-set of a Renaissance lute maker of Augsburg at the end of the sixteenth century.

As expressed by Nurse:

Clearly, if we are to recreate something of the reality of the world of the lute in this period, there is a need for creative thinking and experimentation on the part of the makers and players.<sup>2</sup>

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<sup>2</sup> Ray Nurse, "Design and Structural Development of the Lute in the Renaissance," *Proceedings of the International Lute Symposium Utrecht 1986* (Utrecht 1988), 101-2.

## Chapter 1: Reconstructing a lute

There are numerous ways to approach the construction of a sixteenth-century lute. Instrument makers have been doing so since the early stages of lute making. According to Lundberg, as early as 1580 George Gerle made a lute<sup>3</sup> “...which was probably built as a replica of an antique. Built for a Royal Collection of Curiosities...”<sup>4</sup>

During the Baroque period, lute makers were looking back and reinterpreting the shape and geometry of the instruments of the renowned masters of the early sixteenth century to reproduce the desirable timbre of the old instruments. A good example of this are the lutes made by Joackim Tielke, Martin and Johann Christian Hoffmann around the turn of the eighteenth century, and the instruments made by Thomas Edlinger during the first half of the eighteenth century. The body shape and the number of ribs of these later instruments follow the characteristics of the lutes made by the old masters of Bologna or Padua of the first half of the sixteenth century.

During the second half of the nineteenth century (around one hundred years after the lute fell into disuse), a trend of acquiring encyclopaedic collections of antiques, both by private individuals and museums, generated a market for lutes in Europe and America. Shrewd and often unscrupulous antiques dealers saw an opportunity to fulfil a market demand for old original instruments with forged or composite instruments, made of cannibalized fragments of originals, or entirely newly made reinterpretations of what they thought original instruments were supposed to look like. These objects made their way into some of the most important musical instrument collections in museums,

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<sup>3</sup> Currently part of the collection of the Kunsthistorisches Museum, Vienna (SAM 31).

<sup>4</sup> Robert Lundberg, *Historical Lute Construction* (Tacoma: The Guild of American Luthiers 2006), 4.

puzzling and confusing the first serious researchers of early musical instruments.<sup>5</sup>

Leopoldo Franciolini, one of the most renowned and prolific dealers in antique instruments, is one of the best examples of this practice. Based in Florence, his business reached quite an international clientele including some of the most important collectors in Europe and America. According to Ripin:

An enormous number of instruments of all types passed through Franciolini's hands. Some were left entirely untouched or given only minor and legitimate restoration; others received "improvements" in the form of more attractive decoration, fancy new stands, or fraudulent signatures and inscriptions; still others were actually made from scratch. His merchandise included original instruments that were butchered and modified, as well as newly made instruments, all of them purposefully set up to fulfil the very specific 'antique' look that was sought after by collectors at the time.<sup>6</sup>

These instruments, today considered fakes, composites, or counterfeits, can be regarded as reinterpretations of the idea of the 'antique instrument'. They were overly ornate objects, often not intended to be functional sound-producing instruments, but decorative pieces. They fulfilled a market demand in art and antiques created by collectors and museums in the pursuit of building up collections of musical instruments at a time when the academic field of the study of musical instruments was not yet established.

Around the same time, during the late nineteenth century and the early decades of the twentieth century, the early-music revival movement spawned a new interest in lutes, their music, and construction. This movement included a

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<sup>5</sup> Edwin M. Ripin, "Franciolini, Leopoldo", *Grove Music Online*. Oxford Music Online. Oxford University Press, accessed January 16, 2016, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/10110>.

<sup>6</sup> Edwin M. Ripin, "A Suspicious Spinet", *The Metropolitan Museum of Art Bulletin* 30 (4) 1972, 196-202.

group of serious researchers and musicians studying the music of the Medieval, Renaissance, and Baroque periods. Arnold Dolmetsch, a renowned early music performer and scholar, was one of the leading figures of this revival. In around 1890 he acquired a lute by Michielle Harton (Padova, 1598) and restored it to playing condition.<sup>7</sup> In 1893, Dolmetsch built his first lute<sup>8</sup> using the Harton instrument as a model and after that he continued to make a number of 'early' musical instruments, first in his workshop in London, and later for the piano-making company Chickering and Sons in Boston, Massachusetts, where he was in charge of the construction of early keyboard instruments. There are at least two known lutes built during his period in America (ca. 1907-8).<sup>9</sup>

Dolmetsch returned to London in 1917 and established a workshop in Haslemere, in Surrey, where he built a wide variety of early musical instruments including clavichords, harpsichords, spinets, viols, and recorders, as well as a small number of lutes. As one of the first researchers and proponents of the music of the Renaissance and Baroque periods, Dolmetsch had a limited knowledge of a considerably broad study subject, namely 'The Early Music'. Similarly, his interest in the field of organology was not specific to an instrument or period, but covered all sorts of instruments from the Early-Medieval to the Baroque period. As a result, the musical instruments he built lacked in-depth academic research and were often inaccurate or misconstrued.

Two examples of these flawed reinterpretations of the lute can be found in Dolmetsch's 1930 catalogue. It includes a "LUTE. 18 or 19 Strings, Suitable for the Performance of Early Lute Pieces or the Original Accompaniments to

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<sup>7</sup> This lute is now in the collection of the Folger Shakespeare Library in Washington, D.C.

<sup>8</sup> This instrument is currently part of the collection of the Horniman Museum in London M11-1983.

<sup>9</sup> Nos. 13 and 14 of Dolmetsch's string instruments series.



sixteenth and seventeenth Century Songs...” and on the same page an “ARCHLUTE or THEORBO. 27 Strings, suitable to accompany on the Thorough Bass or to play any Lute Music...”<sup>10</sup> The photographs in the catalogue depicting these items show two instruments which are certainly not accurate reproductions of original instruments, but rather reinterpretations based on instruments that were obviously modified. The lute has a strangely curved peghead glued in a rather shallow angle more suitable for an *oud* than a Renaissance lute; and the archlute has a very distinctive neck extension for a second pegbox which appears to be based on a modified chitarrone with a truncated neck extension (*Figure 2*).

Around the first two decades of the twentieth century Herman Hauser I, one of the most renowned guitar makers of the time, was also constructing lutes in Germany. Hauser was reinterpreting lutes by employing guitar-making techniques and concepts, including fixed metal frets inserted in the fingerboard, and a stylized bridge with a bone saddle very much like the one used in a guitar. Because the ribs and soundboard are substantially thick, and the choice of the materials for their construction is often inaccurate, Hauser’s lutes are significantly heavier and sturdier than any sixteenth- or seventeenth-century lute.

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<sup>10</sup> Arnold Dolmetsch, Sales catalogue (Haslemere, Surrey 1930), 12.



Figure 2. Copy of the Dolmetsch catalogue of 1930.

In 1921 and 1922 Hauser produced two technical drawings, one for the construction of a lute by Wenger and another for a lute by Buchstetter (*Figure 3*). These drawings contain detailed instructions for his construction techniques and ideas, some of which are obvious mistakes: how the neck joins with the body, depicted as a very complex angled dovetail joint (*Figure 4*); a rather short neck; single string riders for the treble and bass courses; a substantial lower

block and internal linings; a semi-circular cross-section of the body; and the design of the clasp<sup>11</sup> which resembles that of a mandolin rather than a lute. Regardless of their inaccuracies, these were some of the first available published technical drawings depicting the construction of lutes, and they were used by numerous luthiers to build instruments. The popularity of these drawings is confirmed still forty years later, when around the time of the second wave of the early music revival they were reproduced in the book *Lute Construction* by Robert S. Cooper in 1963.<sup>12</sup>

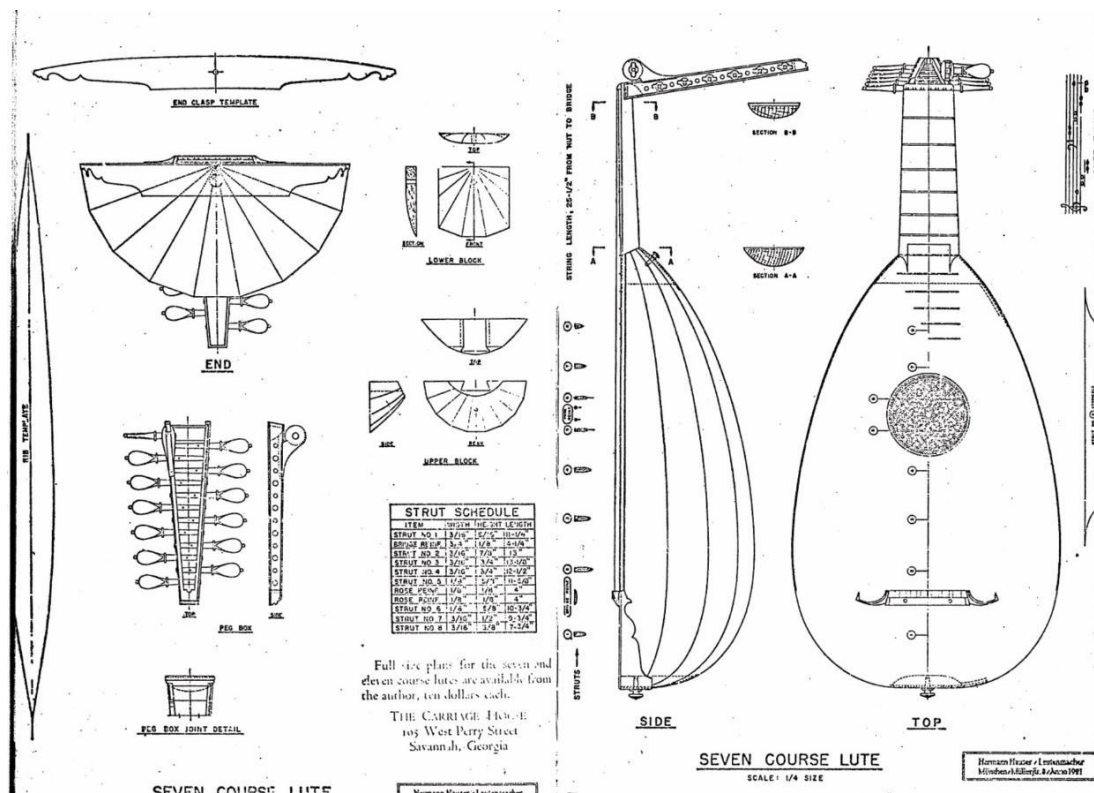


Figure 3. Hauser's technical drawing of a seven-course lute as reproduced in Cooper's book.

<sup>11</sup> Also referred to as 'capping strip'.

<sup>12</sup> Robert S. Cooper, *Lute Construction* (Savannah, Georgia: 1963): unnumbered pages at the end of the book.

In his book, Cooper describes the process of how to “build any lute”<sup>13</sup> of the “many, many lutes worth of being reproduced”.<sup>14</sup> Unfortunately he decided to reproduce a lute by Hermann Hauser, with all the misconceptions previously described (Figure 4).

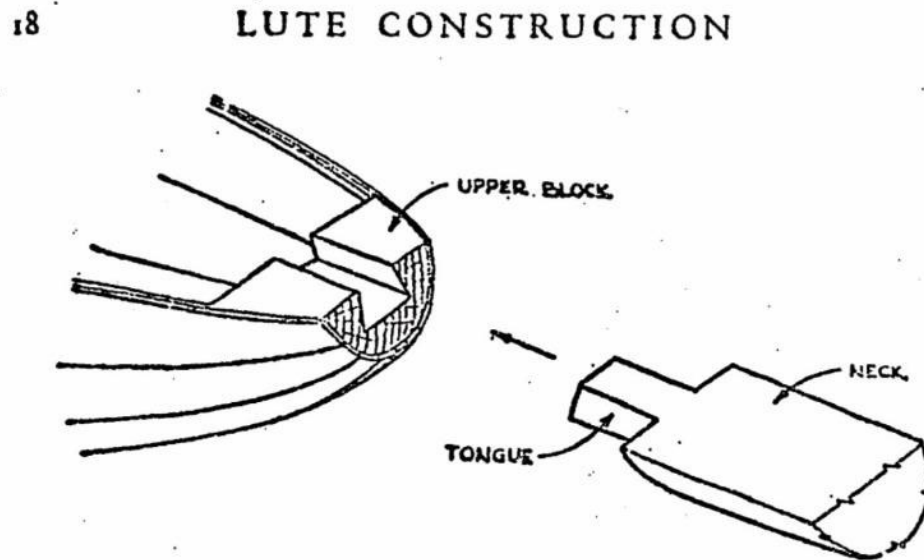


Figure 4. Detail of the neck joint on Cooper's book based on Hauser's drawings.

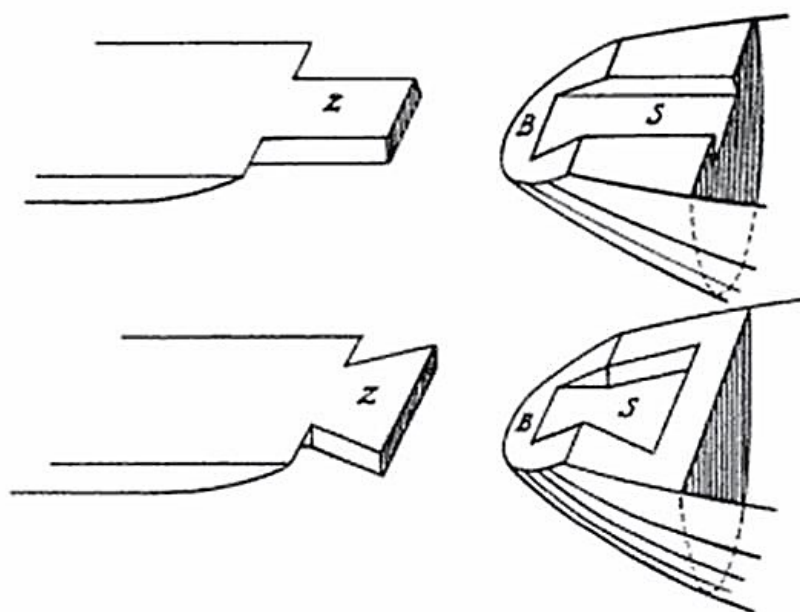
A further example of a publication featuring very similar construction methods is the *Manual of Guitar Technology: The History and Technology of Plucked String Instruments*, by Franz Jahnle. This book was first published in German in 1965, then translated to English in 1981, and reprinted in 2000.<sup>15</sup> In it, Jahnle dedicates a chapter to “The construction of Guitars, Lutes and Citterns” repeating the same misconceptions as Hauser and Cooper (Figure 5). Unfortunately, these

<sup>13</sup> Ibid: xvii

<sup>14</sup> Ibid.

<sup>15</sup> Franz Jahnle, *Manual of Guitar Technology: The History and Technology of Plucked String Instruments* (Westport, CT: Bold Strummer, 2000), 170 – 177.

misleading publications are often taken as an accurate model to follow by a number of luthiers of the time (and even some at the present time).



142. Insertion of the lute neck with straight tenon.

143. Insertion of the lute neck with dovetail.

Figure 5. Detail of the neck join as shown in Jahmel's *Manual of Guitar Technology*, 174.

David "Jose" Rubio is a good example of this. Rubio was an American luthier active from the 1960s and is well known for his classical guitars which were played and endorsed by one of the most renowned guitarists of the time, Julian Bream. In addition, Rubio had an output of Baroque and Renaissance style instruments, including lutes, viols, cellos, and harpsichords. Rubio's lutes follow very closely the style and construction of those made earlier by Hauser. Heavy construction, inlaid frets, and eclectic decorative elements are some of their characteristics.

Evidently these instrument makers were fulfilling the needs of a musical trend that was just starting to develop. Musicians rediscovering the music from the Renaissance and Baroque periods furthered the construction of new instruments emulating the available originals (even if these 'originals' had been

severely modified throughout their existence), as well as the 'restoration' of the originals to playable conditions.

The last three decades of the twentieth century saw a renewed interest in the study and performance of early music. This advancement in the scholarship of the music of the Renaissance and Baroque periods made necessary an equally specialized approach to the study and reconstruction of musical instruments. A number of specialist societies with dedicated publications like the *Early Music Journal*, the *Galpin Society Journal*, and the *Lute Society's Journal* and its quarterly magazine *Lute News*, provided a platform for a growing and more serious field of study and academic research. Articles by Friedemann Hellwig<sup>16</sup> and Ian Harwood<sup>17</sup> were particularly relevant in this regard; they are amongst the first examples of lute construction publications based on historical research.

In 1978 the Lute Society published its fourth Booklet, *Lute Construction* by Philip MacLeod-Coupe.<sup>18</sup> This publication is a basic step-by-step guide for the construction of a seven-course lute and it is meant to be used side-by-side with a drawing by the same author published by the Lute Society which he describes as "not a copy of a particular instruments but follows the principles of construction found in old lutes".<sup>19</sup> Although this publication is certainly an improvement on the previously discussed attempts by Hauser or Cooper, the content is a quite basic manual of how to make a generic lute. It describes the

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<sup>16</sup> Friedemann Hellwig, "On the Construction of the Lute Belly", *The Galpin Society Journal*, Vol. 21 (Mar., 1968), 129-145. Also "Lute Construction in the Renaissance and the Baroque" *The Galpin Society Journal* Vol. 27 (May, 1974), 21-30.

<sup>17</sup> Williams, W. G. and Ian Harwood, "Lute Construction and Playing". *Early Music*, April 1975, vol.3(2). Oxford University Press: 177-85.  
<http://www.jstor.org.ezproxy.is.ed.ac.uk/stable/3125976>.

<sup>18</sup> The Booklets Committee of the Lute Society included the then president Diana Poulton, Ian Harwood, Anthony Rooley, David Scott, and Francesca MacManus. Philip Macleod-Coupe. *Lute Construction*. Lute Society Booklets; No. 4. Richmond, (England: Lute Society, 1978).

<sup>19</sup> Macleod-Coupe, 3.

parts of the lute and gives a short description of the method employed for their construction, as well as the best timber<sup>20</sup> and adhesives to be used. An obvious mistake in this booklet is the use of a semi-circle as the cross section of the body, which is historically inaccurate; no original lute from the sixteenth or seventeenth century has a semi-circular section. Lutes with this body shape are characteristic of the mid-twentieth century, and it is likely due to the fact that it is considerably easier to make a lute in which all the ribs are identical in shape. Macleod-Coupe describes a very simple method to achieve this by making the ribs using a wedge-like template.

The following year the book *Making Musical Instruments* was published, and it included six chapters dedicated to the construction of specific instruments, including one about the lute written by Ian Harwood.<sup>21</sup> In it, Harwood describes a similar step-by-step system to that described in the Lute Society Booklet for the construction of “one of the several kinds of lute in use around the year 1600, namely, a seven-course tenor instrument”.<sup>22</sup> His approach is evidently based on historical research, although like Macleod-Coupe, the proposed model is based on a “simplified method”<sup>23</sup> and not on any particular maker or school. This text is manifestly aimed at an audience of non-specialists, or as stated by Anthony Baines in the foreword of the book, “...for those who are executants, historians” and “...in addition to these two things, instrument makers also”.<sup>24</sup> It contains a substantial amount of useful information and a very practical approach towards the construction of a simple instrument. On

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<sup>20</sup> He neglects to mention which wood to use for the block and the counter-cap, which he calls “liner”.

<sup>21</sup> Ian Harwood, “The Lute” *Making Musical Instruments: Strings & Keyboards*. Ed. Charles Ford. (London & Boston: Faber & Faber: 1979), 37 – 67.

<sup>22</sup> Harwood, 37.

<sup>23</sup> Ibid.

<sup>24</sup> Anthony Baines, “Foreword” *Making Musical Instruments: Strings & Keyboards*. Ed. Charles Ford. (London & Boston: Faber & Faber: 1979), 11.

the other hand, probably due to its intended audience, it also has a number of misconceptions or oversimplifications, e.g. the use of a historically inaccurate model; a semi-circular cross section of the body;<sup>25</sup> a butt-joint of the pegbox to the neck; a counter-cap made of the same wood as the ribs; and the use of polyvinyl-acetate glue as the adhesive to be used for most of the construction.

In 1983, Ronald Zachary Taylor published the book *Making and Playing a Lute*.<sup>26</sup> Once more this book is an amateurish hobbyist step-by-step guide to making a generic seven-course lute “based on historical designs from the golden era”<sup>27</sup> lacking any indication of which designs, from what region, or what the author means by the golden era. It includes an introduction in which the author summarizes the history of the lute from “3,500 years ago”<sup>28</sup> to its “decline and eventual fall from favour”<sup>29</sup> in only two pages! This book certainly cannot be regarded as a serious attempt to recreate or reconstruct a historically accurate lute, but a rough guide to building a rather loose reinterpretation of it. Some of its most obvious faults are: the suggestion of alternative woods for the construction of the soundboard;<sup>30</sup> the use of a lower block for the construction of the body; a semi-circular cross section; a rather unusual technique of adding the spacers between the ribs as inlays after the bowl is completed; the use of a fretsaw and needle-files to carve the rosette; spurious rosette designs provided; etc.

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<sup>25</sup> Using the same method described by Macleod-Coupe.

<sup>26</sup> Ronald Zachary Taylor, *Make and Play a Lute* (Hertfordshire: Argus Books LTD, 1983).

<sup>27</sup> Ibid, 5.

<sup>28</sup> Ibid, 4.

<sup>29</sup> Ibid, 5.

<sup>30</sup> Ibid, 13. The author suggests cedar, hemlock, and fir as substitutes for spruce.



In 2002, the Guild of American Luthiers posthumously published Robert Lundberg's book, *Historical Lute Construction*.<sup>31</sup> This book is probably the most complete and serious attempt to reconstruct a lute based on historical research. It is divided into two main sections. The first part describes the history and development of the lute; it is a compilation of a series of lectures presented by the author for an annual seminar of lute-making in Erlangen, Germany beginning in 1978, which were previously published as articles by *American Lutherie*, the journal of the Guild of American Luthiers from 1987 to 1994. The second part is a practicum of how to make a lute with practical solutions for each step.

Even with the benefit of the increasing knowledge achieved in the last four decades there are numerous ways of approaching the reconstruction of a lute. Often this is limited by a number of circumstances of a rather pragmatic nature. Nowadays, just like in the Renaissance, lute makers produce instruments mainly for musicians, with the fundamental objective of fulfilling their needs and constricted by the musical trends in vogue. As luthiers satisfy the supply for a very specific demand, the historical accuracy of the produced instrument is often second to the budget and musical ideas of the client, the musician. A lute with seven or eight courses is often preferred by the starting musician due to its versatility which would allow a broad range of repertoire, rather than a six-course lute which would limit the repertoire to a specific time period. At the same time, six-course lutes are often sold at slightly lower prices and are cheaper to maintain<sup>32</sup> and therefore very popular amongst amateur musicians

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<sup>31</sup> Robert Lundberg, *Historical Lute Construction* (Tacoma: The Guild of American Luthiers, 2002).

<sup>32</sup> A smaller number of courses requires a smaller monetary investment to replace strings.

and beginners. Similarly, lutes with a small number of ribs are much more prevalent as they are more economically produced.

Another interesting limiting factor for the construction of historically informed lutes is the availability of reliable technical drawings. Most lute makers will not conduct original research in public collections, but rely on the readily available resources. It is therefore not surprising that a large number of instruments built in the last 30 years are based on the same few original instruments for which technical drawings were widely available, e.g. Renaissance lutes based on the technical drawing of the lute by Hans Frei, currently part of the Kunsthistorisches Museum Vienna (C.34), drawn by Gerhard Söhne in 1979; or eleven-course and thirteen-course lutes based on the technical drawings of instruments by Johann Christian Hoffmann, currently at the Musical Instruments Museum, Brussels (MIM1559 and MIM3188), drawn by Geert Vermeiren in 1977 and 1975.<sup>33</sup>

It is important to recognize the important achievements in the field of historical lute construction by some of the luthiers of the last century. Michael Lowe, Stephen Gottlieb, Stephen Barber, David Van Edwards, and Tiziano Rizzi are amongst some of the lute makers who brought the field of lute making to the very high standards of the present time.

There is not a single and universal way of approaching the construction of a lute. Despite the intentions of those striving to produce instruments closely following historical research and performance, there are also modern luthiers who insist on reproducing the misconceptions of the lute making of the 1960s, building very heavy instruments with bulky lower blocks, newly designed

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<sup>33</sup> <http://homepages.ed.ac.uk/am/iwd.html#Lutes> consulted on 01/08/2017.

rosettes, internal lining, and guitar-like bindings. Concurrently a supply of instruments made in small factories based mainly in the United Kingdom,<sup>34</sup> Pakistan,<sup>35</sup> and Turkey<sup>36</sup> has appeared in the market in the last few years. These low-priced, but also low-quality instruments, often based on typical models like Frei or Hieber, are sold either finished or as kits to be assembled by amateur musicians and hobbyists. The Early Music Shop advertises on their website that each kit is “supplied with a completely pre-assembled back, which overcomes the frustrations that many kit builders found with our previous lute kits. Each part is carefully shaped ready for assembly, with only limited hand-skills required. We now include a pre-cut rose to encourage those of you who are less adventurous!”<sup>37</sup> Evidently these instruments are not meant to be historically accurate reproductions but to supply a specific niche market.

A completely different approach to lute construction today is the creation of newly designed instruments based on the ideas and construction techniques of the lute, often applying new technologies. This could be regarded as the creation of the next generation of instruments of the lute family, some examples being the solid body electric lute,<sup>38</sup> lutes with amplification capabilities and tuning machines, etc.

This project is by no means the first attempt to recreate a historically correct lute from the Renaissance. It is therefore important to establish that the described process is not the only valid approach to the reconstruction of a historical instrument, nor are the construction techniques the only possible

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<sup>34</sup> The Early Music Shop, Salts Mill, Victoria Road, Saltaire, West Yorkshire, BD18 3LA.

<sup>35</sup> Quality1Trader LTD, and Roosebeck by Mid-East Mfg., Incorporated.

<sup>36</sup> Cankaya Music.

<sup>37</sup> <http://www.earlymusicshop.com/product.aspx/en-GB/1000511-ems-7-course-renaissance-lute-kit> consulted on 16/02/2016.

<sup>38</sup> <http://www.specimenproducts.com/electric-lute/> and

<http://www.electricleuteproject.com/about.html> consulted on 17/02/2016.

method of building a lute. The main scope of this project is to document step by step the thought process, both as a creative and a research endeavour, as well as the physical reconstruction of a historically accurate lute as intended originally by Sixtus Rauwolf.

In order to achieve this, the first approach should be to try and understand the physical characteristics of the lutes manufactured around the productive life of Sixtus Rauwolf—from 1577 to ca. 1625—which falls within the period considered as the ‘late Renaissance’ (1550 – 1620).<sup>39</sup> No single source provides a full and definitive answer to the question “how did a Rauwolf lute look when completed in Rauwolf’s shop?”. Instead this understanding will be achieved through the cross-examination of four main sources of information from the period: written sources, printed music, iconography, and extant lutes.

### Written sources

From around 1440 we find treatises published in Europe with sections dedicated specifically to describing the lute; they provide an insight into the characteristics, construction, development, and social context of the lute.

One of the first such treatises was written by Henri Arnaut de Zwolle.<sup>40</sup> Arnaut was a physician, astrologer, and astronomer, as well as an author who worked under the service of “Philip the Good, Duke of Burgundy, as ‘*professeur en medecine*’, ‘*astronomien*’ and ‘*maistre ... en astrologie*’. Between 1454 and 1461 he left the Burgundian court in Dijon and entered the service of the French king in

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<sup>39</sup> Robert Lundberg, *Historical Lute Construction* (Tacoma: The Guild of American Luthiers 2006), 7.

<sup>40</sup> Arnaut, Henri, Georges Le Cerf, Edmond René Labande, and Bibliothèque Nationale. *Les Traités D'Henri-Arnaut De Zwolle Et De Divers Anonymes* (Paris: Bibliothèque Nationale, MS. Latin 7295). Documenta Musicologica. 2. Reihe: Handschriften-Faksimiles; 4. (Kassel: Bärenreiter, 1972).

John Koster suggests that this manuscript was written between about 1438 and 1446, whilst Arnaut was living in Dijon.

Paris (Charles VII, and later Louis XI), where he died of the plague".<sup>41</sup> In his treatise, Arnaut includes a wide array of subjects, ranging from the description of a folding ladder and a machine to polish gems, to the study of astronomy and hydraulics, as well as tables and technical drawings of the construction of astronomical and musical instruments. On the design of musical instruments, he provides meticulous information on the design and construction of the lute and keyboard instruments, including the clavichord and the organ, as well as one of the earliest descriptions of a harpsichord.

The description and the technical drawing of the lute presented in Arnaut's treatise have been thoroughly studied by numerous scholars and luthiers.<sup>42</sup> However, "Arnaut's description is brief, general, and not very clear",<sup>43</sup> and it lacks "... information about liners, bars, neck, fingerboard, peg box, bridge, and number of courses".<sup>44</sup> It is evident that this was not made by a lute maker, but as a part of an encyclopaedic endeavour.

Sebastian Virdung's *Musica getuscht und angezogen*, published in 1511,<sup>45</sup> is probably the first treatise dedicated to the study of counterpoint and composition. It also contains sections focused on the study of musical

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<sup>41</sup> John Koster. "Arnaut de Zwolle, Henri." *Grove Music Online*. Oxford Music Online. Oxford University Press, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/01282>. Accessed November 10, 2015.

<sup>42</sup> Some examples of this are: the previously mentioned article by John Koster, Ian Harwood. "A Fifteenth Century Lute Design." *The lute Society Journal*. Vol.2 1960. Lorenzo Lippi. "Il liuto pre-rinascimentale secondo il manoscritto di Henri Arnaut de Zolle", *Liuteria*, no.11 (August, 1984) 16-26. Kottick, Edward L. 1973. "Building a fifteenth-century Lute". *The Galpin Society Journal* 26. Galpin Society, 72-83.

<sup>43</sup> Kottick, 72.

<sup>44</sup> Ibid.

<sup>45</sup> Sebastian Virdung, *Musica getuscht vnd ausgezogen durch Sebastianu[m] virdung Priesters von Amberg vnd alles gesang aus den note[n] in die tabulature[n] diser benante[n] dryer Instrume[n]te[n] der Orgeln: der Laute[n]: vnd d' Flöten transferieren zu lerne[n]: Kurtzlich gemacht zu eren de[n] hochwirdige[n] hochgebornen fürsten vnnd herren: herr wilhalmen Bischoue zü Straszburg seynem gnedige[n] herren*, (Basel, 1511).

instruments, grouping them in families, including illustrations and descriptions. Virdung provides an explanation of the lute and the playing techniques, together with a detailed illustration of a lute's neck, indicating the strings, their tuning, and each of the notes that will result from stopping the strings at specific frets (Figure 6). In Virdung we also find the first reference to a seven-course lute.

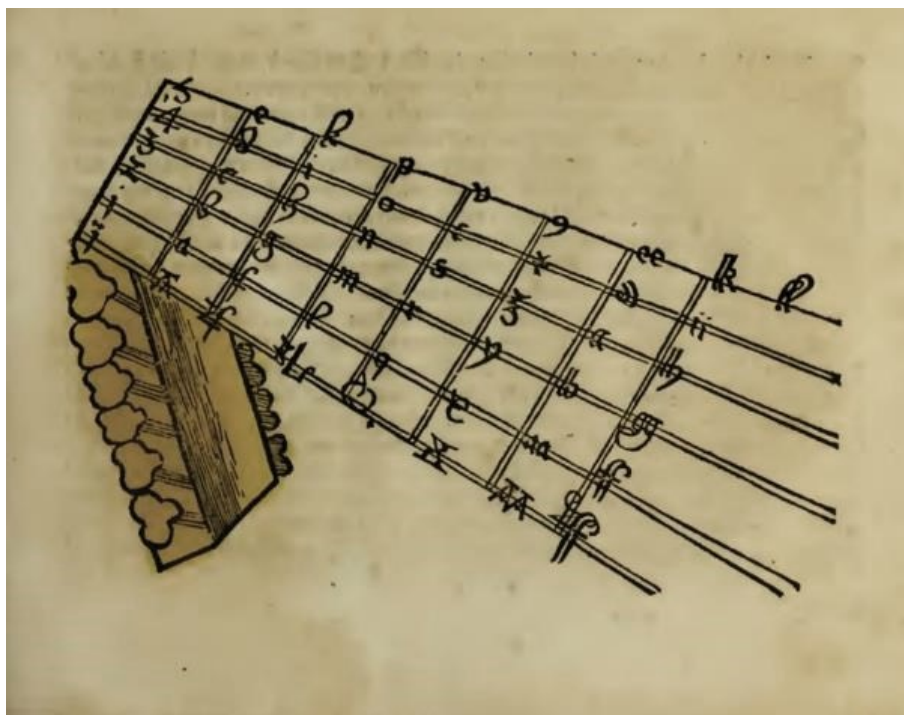


Figure 6. Sebastian Virdung, *Musica getuscht und angezogen*, 1511.

Martin Agricola's *Musica instrumentalis deudsch* (1529)<sup>46</sup> is one of the most important works in early organology, closely following Virdung's *Musica getuscht*, copying many of its woodcuts. Agricola was a Lutheran musician and teacher from Saxony, and he intended his treatises to be employed as textbooks for musical performance. The first edition of the *Musica instrumentalis deudsch*, was written mostly in rhymed verse and included woodcut diagrams and depictions of musical instruments, as well as practical information with regards

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<sup>46</sup> Martin Agricola, *Musica instrumentalis deudsch* (1529).

to the performing methods, including fingering techniques, tuning and notation. A revised and almost completely rewritten edition was published in 1545.

Vincenzo Galilei, in his *Fronimo Dialogo di Vincentio Galilei*,<sup>47</sup> published in 1569,<sup>48</sup> presents a dialogue between Eumatius, a lute student, and his teacher Fronimo,<sup>49</sup> discussing the tuning, playing techniques and repertoire for the lute, including ornamentation, arranging, and composition. In it, Fronimo defends the lute against the organ for its ability “to express the affections of harmonies, such as hardness, softness, harshness and sweetness and consequently shrieks, laments, complaints and weeping, with such grace and wonder”.<sup>50</sup>

A second revised version of the *Fronimo*, published in 1584,<sup>51</sup> is one of the first music publications to describe the use of equal temperament, which Galilei regarded as the only solution for instrumental tuning.<sup>52</sup> Galilei acknowledged the problematic nature of the wide thirds of the equal temperament, but argued that the gut strings of the lute and viols would soften their discordant effect

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<sup>47</sup> Vincenzo Galilei, *FRONIMO DIALOGO / DI VINCENTIO GALILEI FIORENTINO, / NEL QUALE SI CONTENGONO LE VERE, / et necessarie regole del Intavolare la Musica nel Liuto*, (Venice: Girolamo Scotto, 1569).

<sup>48</sup> The date on the front cover is 1568 but the book was first published in 1569 by Girolamo Scotto. A revised edition was published in 1584.

<sup>49</sup> *Fronimo* means practical wisdom and *Eumatius* means he who learns easily. Peter Argondizza, *The Order of Things: A Reappraisal of Vincenzo Galilei's Two Dialogues Fronimo 1568 and 1584*, 5.

<sup>50</sup> Galilei, 30.

<sup>51</sup> Vincenzo Galilei, *FRONIMO / DIALOGO / DI VINCENTIO GALILEI / NOBILE FIORENTINO, / SOPRA L'ARTE DEL BENE INTAVOLARE, / ET RETTAMENTE SONARE LA MUSICA / Negli strumenti artificiali si di corde come di fiato, & in particolare nel Liuto*, (Venice: 1584).

<sup>52</sup> Claude V. Palisca. "Galilei, Vincenzo." *Grove Music Online*. *Oxford Music Online*. Oxford University Press, accessed November 7, 2016 <http://www.oxfordmusiconline.com/subscriber/article/grove/music/10526>.

which would be intolerable on instruments with iron strings like the harpsichord.<sup>53</sup>

Michael Praetorius was a German composer, music theorist and organ player. According to Blankenburg "he was the most versatile and wide-ranging German composer of his generation and one of the most prolific".<sup>54</sup> One of his most important publications is his *Syntagma musicum*, published in three parts between 1614 and 1620.<sup>55</sup> It is an in-depth study of the theory and practice of music with an encyclopaedic approach. The second part, *Tomus Secundus de Organographia*, was published in 1618 and is dedicated to the study of musical instruments and their use. It was followed by an illustrated appendix entitled *Theatrum instrumentorum seu Sciagraphia*,<sup>56</sup> an important resource for the study of musical instruments of the time. It contains forty-two woodcuts, portraying musical instruments grouped in *families* drawn to scale and included a reference ruler (*Figure 7*).

Praetorius dedicates chapter 24 of his *De Organographia* to describing the *Testudo-lute*,<sup>57</sup> including a table with the different sizes of lutes indicating the tuning of the first string of each, as well as a table for the tuning of lutes with different number of courses (six to nine courses).<sup>58</sup>

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<sup>53</sup> David Dolata, *Meantone Temperaments on Lutes and Viols*, Publications of the Early Music Institute, (Indiana: University Press, 2016).

<sup>54</sup> Walter Blankenburg and Clytus Gottwald. "Praetorius, Michael." *Grove Music Online*. Oxford Music Online. Oxford University Press, accessed December 27, 2016, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/22253>

<sup>55</sup> A fourth part with focus on the instruction in composition was planned but never took place.

<sup>56</sup> Published in 1620.

<sup>57</sup> Praetorius, 49-51.

<sup>58</sup> Praetorius, 27 (table 24).



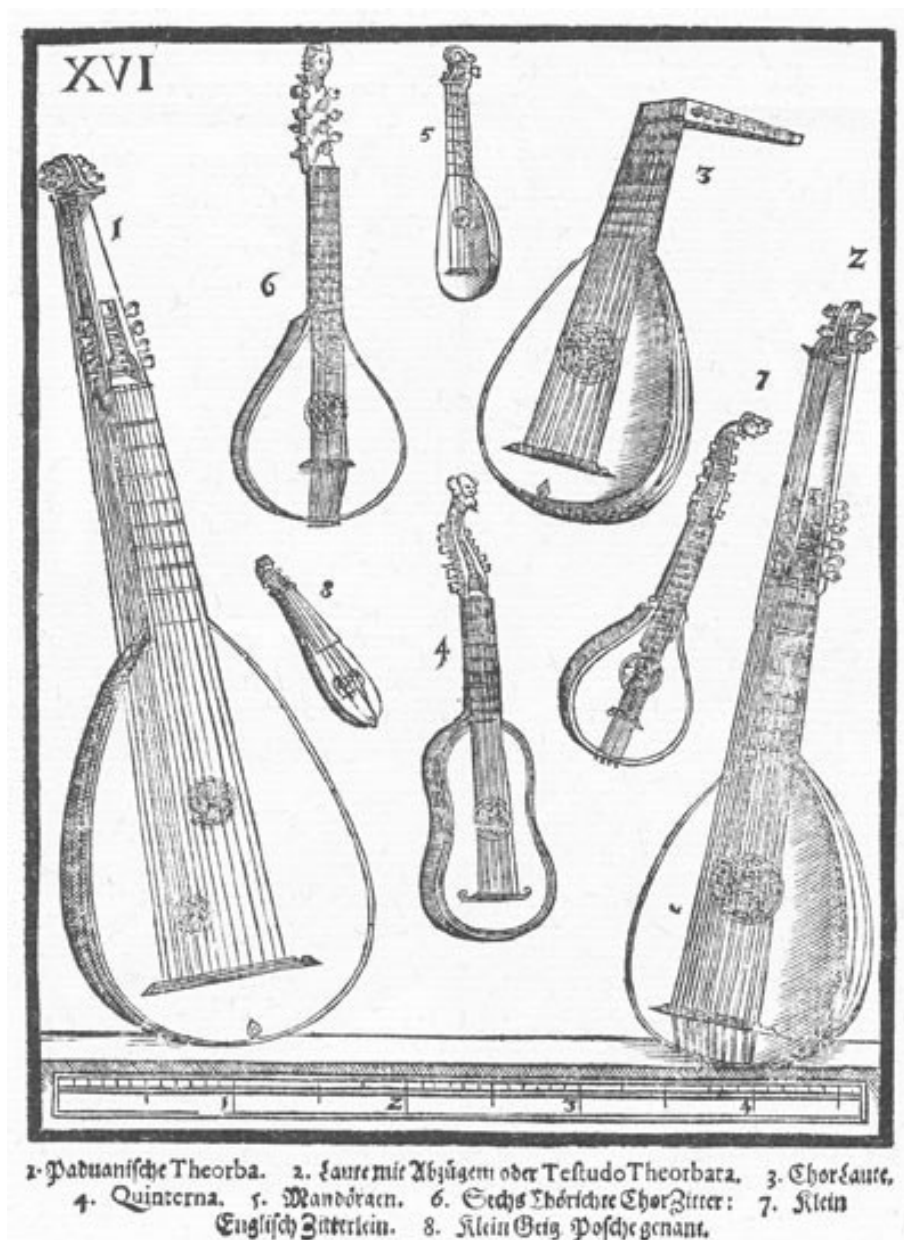


Figure 7. Plate XVI of *Theatrum Instrumentorum* by Michael Praetorius. 1620.

Mersenne's *Harmonie Universelle* was first published in Latin in 1635 and a second version in French was published the following year,<sup>59</sup> consequently, this treaty falls out of the proposed time period covered in this study. However,

<sup>59</sup> Mersenne, Marin. *Harmonie Universelle : Contenant La Théorie Et La Pratique De La Musique*. Paris, 1636. Édition Facsimilé De L'exemplaire Conservé À La Bibliothèque Des Arts Et Métiers Et Annoté Par L'auteur. (Paris: Centre National De La Recherche Scientifique, 1965).

Mersenne describes the lute as a well-established instrument, and not as a novelty. It can be stated that his is an attempt to illustrate lutes previously made, and therefore it is plausible that his description of the lutes of the studied period could be accurate, and therefore should be taken into account.

Mersenne dedicates a substantial part of his *Second Book of String Instruments* to the lute, providing very detailed information about its construction, strings, fretting, tuning, playing, etc. It is divided into seventeen parts or 'Propositions', ten of the first twelve dedicated to the lute,<sup>60</sup> although often his propositions mention specifically the lute but include other instruments, e.g. Proposition V: *"To show how the system of Aristoxenos is used on the lute, and on the other instruments with fretted fingerboards..."*.<sup>61</sup>

Of particular importance for this reconstruction project are the first three propositions of this second book:

- Proposition I. *"To explain the figure, the parts, the pitch or the tuning and the temperament of the lute, and the theorbo"*.<sup>62</sup>
- Proposition II. *"To explain the method by which the lute and Pandora ought to be constructed, and all the other instrument which they resemble, as it ought to be shown to perfection, and how one can recognize whether the strings are good"*.<sup>63</sup>
- Proposition III. *"To explain the method of dividing the fingerboard of the lute, and where to place all the frets necessary to play in perfection. In which one sees more curious observations on strings and the difference of their sounds"*.<sup>64</sup>

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<sup>60</sup> Propositions IV is dedicated to the *"genres and species of music proposed by the Greeks..."* and Proposition VIII to the *"... diatonic genre of music"*.

<sup>61</sup> Mersenne, 86 – 90.

<sup>62</sup> Mersenne, 73 – 77.

<sup>63</sup> Mersenne, 77 – 82.

<sup>64</sup> Mersenne, 82 – 84.

Additional written sources, rich in information about the lute whilst originally intended to address a different subject matter, are the inventories, either of wealthy families' households, instruments maker's workshops, or holdings of orchestras and musical ensembles.

Amongst these, the inventory of musical instruments and music of Jacob Fugger, first recorded in 1566, is of particular importance.<sup>65</sup> It lists the collection of musical instruments of Raymund Fugger which, according to Douglas Alton Smith, was the largest in Europe in the sixteenth century.<sup>66</sup> It comprised 158 instruments, including keyboards, winds, viols, and 142 lutes. After the death of Raymund, the whole collection—including the instruments and printed music—was offered for sale to Duke Albrecht of Bavaria. This transaction was declined by the Duke, so it remained in the Fugger family, passing first to Raymund's brothers Christoph, who died in 1579, and then to Ulrich who died five years later in 1584. A second inventory was made in 1580, and shows that the collection was still almost entirely intact".<sup>67</sup> Unfortunately, after Ulrich's death it was acquired by the Pfalzgraf Casimir, and "when Elector Maximilian of Bavaria captured Heidelberg in 1622 the holdings of the library, presumably including the instruments, were sent to the Vatican as a gift to Pope Gregory XV".<sup>68</sup> After that the whereabouts of all the instruments in the collection are unknown.

This document provides valuable information with regards to the construction of lutes at the time. The instruments are listed either grouped in sets of up to

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<sup>65</sup>Kurbayern Äusseres Archiv Nr. 4851 (formerly Libri Antiquitatum, Tom. I) folios 170-180.

<sup>66</sup>Douglas Alton Smith, *A History of the Lute from Antiquity to the Renaissance* (Lexington, Va.: Lute Society of America, 2002), 175.

<sup>67</sup> Douglas Alton Smith, "The Musical Instrument Inventory of Raymund Fugger." *The Galpin Society Journal* 33 (1980), 36.

<sup>68</sup> Ibid.

four lutes, or individually itemized, often the entries describe their size, the material of which they were made, and a handful of them also include either the place where they were made or the name of its maker.<sup>69</sup>

The inventory of the Marquis Ferdinando d'Alarçon<sup>70</sup> recorded in 1592 contains a number of musical instruments including a small number of lutes. The lutes are described as follows:<sup>71</sup>

Entry no.	Original description in Italian	Translation
166	<i>Uno liuto grandiss[im]o senza corde co la sua vesta</i>	A very large lute without strings with its cloth bag
168	<i>Uno liuto ad dui manichi co la sua vesta</i>	A lute with two necks and its cloth bag
169	<i>Tre liuti dui ordinarij et uno piccolo de ebano co le cascie</i>	Three lutes, two of which normal [size], and one small ebony lute, with their cases
171	<i>Uno liuto piccolo rotto</i>	A small broken lute
172	<i>Quattro cascie de viola e tre de liuto rotte</i>	Four broken vihuela cases and three broken lute cases

The description of these instruments provides little relevant information for this project, although it confirms the coexistence of lutes of different sizes and materials. Of particular importance is the description of a lute with two necks, which was at the time a novelty.

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<sup>69</sup> The only maker mentioned by name is Sixtus Rauwolf.

<sup>70</sup> Alberto Mammarella and Lisa Navach. "Musical Instruments in a 1592 Inventory of the Marquis Ferdinando D'Alarçon." *The Galpin Society Journal* 59 (2006): 187-205. <http://www.jstor.org.ezproxy.is.ed.ac.uk/stable/25163866>.

<sup>71</sup> Mammarella, 193.

The *Inventarium instrumentorum musicorum*<sup>72</sup> of the Stuttgart Hofkapelle of 1589 is an inventory of the music and musical instruments appertaining to the ensemble. It includes a list of lutes entrusted to the lutenists of the ensemble: Georg Reyßmüller, Tiberio Palamanuto, and Benedict Ruinoth.<sup>73</sup> This inventory is a considerable source of information, the entries for the lutes including descriptions of their size, materials, place of construction, number of strings or courses, and even the name of the maker.<sup>74</sup> Unfortunately the information provided in each entry is inconsistent and not every instrument is listed with a full description.

A few inventories of the holdings of the workshops of lute makers of the time, like Magno and Moisé Tieffenbrucker<sup>75</sup> and Laux Maler also provide some information with regard to the construction and production of lutes.

The posthumous inventory of Laux Maler's workshop gives a clear idea of a quite substantial production of lutes. It lists more than 1100 finished and partially-finished lutes as well as large amounts of parts and materials for the production of instruments on a large scale. Similarly, the Tieffenbrucker inventory of October 1581 lists 376 finished lutes, 36 unfinished, 10 cornetti, as well as large quantities of parts and materials.

## **Printed music**

The development of the lute is intrinsically linked to the development of music in a symbiotic manner. New ideas and technologies in the construction of the lute, like the expansion of its lower register via the increasing number of

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<sup>72</sup> *Inventarium instrumentorum musicorum. 1589 angelegt, mit Nachträgen bis 1594.* Landesarchiv Baden-Württemberg. Hauptstaatsarchiv Stuttgart.

<sup>73</sup> Dagmar Golly-Becker, *Die Stuttgarter Hofkapelle unter Herzog Ludwig III (1554 - 1593)*, (Stuttgart: Metzler, 1999), 115, 216, 217, 232.

<sup>74</sup> Including Sixtus Rauwolf.

<sup>75</sup> Smith, (Appendix I) 308-318.

courses towards the bass, had a direct impact on its musical possibilities by providing a wider compass for the composers. At the same time, the new ideas in music with the developments in counterpoint required an extended range of bass notes, demanding instruments with lower strings.

Therefore, in contrast to the interpretation of iconographic sources which can be to a certain extent unreliable, the presence of the extra courses in printed music is without doubt a definitive proof of their use at a particular time, although once again we cannot exclude their invention before the publication of the music. It is more likely that a piece was written for an existing instrument rather than creating an instrument to play a pre-existent piece of music.

Looking at the specific time period in which Rauwolf designed and constructed lutes, we can establish that the majority of the printed music was for lutes with six, seven, or eight courses. This often depended on the specific geographic location where the music was written or printed. And because instrument makers would likely fulfil the needs of the market where the instrument was to be sold, the number of courses of a lute depends more often on the customer's location and specifications and not necessarily on the place where the instrument was built.

Another consideration to keep in mind while studying printed music of the period is whether the publication included new music or if it is a compilation or transcription of already popular pieces for lute. Numerous publications were dedicated to the publication of fashionable pieces and often the publication and commercialization of new music would take a substantial amount of time.



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V.

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IESV nomen sanctissimū, suaue & salub. 4 Voc. i pars. CLEMENS, nō PAPA.

B

Figure 8. First example of printed music for seven-course lute. *Fantasia 4 vocum*, Bálint Bakfark, 1565.

## Iconography

Emanuel Winternitz describes the use of iconography in the study of musical instruments from the perspective of an art historian, as a source of information to understand "...instruments as traditional attributes of allegorical figures, as integral elements of mythical and religious beliefs and images, and as telling tools of social customs and traditions",<sup>76</sup> and from the standpoint of music historians as a source of information to "those many instances in which the answers could not be provided by surviving instruments".<sup>77</sup> Musical scenes portrayed in paintings, sculptures, and other graphic arts often provide more reliable and graphical information than written descriptions of music or musical instruments; although this information presents its own challenges of interpretation. This is particularly true during the Renaissance, when the graphic arts were reaching not only a pinnacle of technical accomplishment, but also a highly developed ideological complexity.

Although the Renaissance ethos strives in the objective appreciation of the world, it also exalts the representation of ideas translated into allegorical and symbolic images. Therefore musical iconography of the Renaissance cannot be taken as a literal or accurate representation of reality. That is, instruments depicted in art convey meaning beyond their use or their musical significance.

Without a doubt, the lute was the "most important musical instrument"<sup>78</sup> throughout the sixteenth century in Europe. And it is probably, due to its popularity, one of the most depicted musical instruments of the Renaissance.

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<sup>76</sup> Emanuel Winternitz, *Musical Instruments and their Symbolism in Western Art* (London, Faber and Faber Limited, 1967), 17.

<sup>77</sup> Ibid.

<sup>78</sup> Jan W.J. Burgers, *The Lute in the Dutch Golden Age: Musical Culture in the Netherlands 1580 – 1670* (Amsterdam: Amsterdam University Press, 2013), 10.



The lute played a remarkable role as a “ubiquitous phenomenon” in the literature and the visual arts of the sixteenth and seventeenth centuries,<sup>79</sup> often as the source of allegoric and figurative connotations that “seems to be used to put across all kinds of messages, positive as well as negative”.<sup>80</sup> A basic example of this is the lute as a metaphoric representation of Music (Figure 9) as a whole or as the sense of Hearing (Figure 14). Although any instrument could be depicted to represent either of these concepts, and frequently more than one instrument is part of the composition, it is the lute that time and again is chosen as the centrepiece of the image.



Figure 9. Muziek, Johann Sadeler (I), ca.1560 - 1600. Print. Rijksmuseum, Amsterdam RP-P-OB-7495.

<sup>79</sup> Burgers, 7.

<sup>80</sup> Burgers, 199.

In early representations, both in paintings and sculptures, the lute is often depicted not played by mere humans but by angels or celestial figures as a symbol of higher morality, incorruptibility, and harmony (*Figure 10*).



*Figure 10.* Melozzo da Forlì, Angel with Lute, c1480. Photo. Encyclopædia Britannica Online. Web. 22 Nov. 2016.

According to Rebuffa, in its early representations, the lute can be interpreted as an “allegory of fertility, evoking with its belly-shaped bowl the pregnant womb”.<sup>81</sup> In other instances, the lute is represented with a mythological connotation, often played by nymphs, or as the embodiment of the Apollonian essence. This is particularly true during the sixteenth century, when Humanistic ideas of the Renaissance associate the lute with Classical Antiquity, evocating real or fabricated ancestors.<sup>82</sup>

When studying depictions of the lute within a symbolic or religious frame, it is imperative to understand that divine figures like angels and gods were not thought to be subject to earthly laws, and therefore their artistic representations cannot be regarded as accurate portrayals of reality. Although these depictions allow us to better understand some aspects of their shape and construction, the musical instruments played by angels as well as their playing techniques can occasionally be regarded as fantastical as the angels themselves (*Figure 11, 12, 13*).



*Figure 11. Three musician angels beneath a canopy, by Bernardino Lanino, c1540. Museo Nazionale della Scienza e della Tecnologia, Milan, Italy. The instruments and playing techniques employed by the angels are certainly fantastical, the only plausible realistic instrument in this depiction is the lute.*

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<sup>81</sup> Davide Rebuffa, *Il Liuto* (Palermo: L'Epos, 2012), 200.

<sup>82</sup> Burgers, 10.





Figure 12. Detail of a fantastical instrument played by an angel in the fresco of the Assumption of the Virgin by Gaudenzio Ferrari in the cupola of Santa Maria dei Miracoli in Saronno, 1535.



Figure 13. Detail of Concert of Angels and Nativity by Matthias Gruenewald, c. 1515, Oil on wood, Musée d'Unterlinden, Colmar. Notice how the angel is holding the bow backwards.

The heavenly status of the lute in pictorial representations changed by the mid-sixteenth century when it became more commonly represented in domestic scenes. Often alluding to a higher social status and cultural sophistication of the depicted patron, the lute is used as a symbol of harmony between people, like marriage or family life, when often we find it played together with other instruments, or accompanying a singer. Similarly, the lute is used as an allegory of temperance, with the subject – more commonly a woman – depicted tuning the lute rather than playing it. This representation of the lute is not exclusive of the mid-sixteenth century; it appears in numerous paintings up until the early eighteenth century, its interpretation varying either as the aforementioned allegory of temperance or as a portrayal of a common occurrence whilst playing the lute, which, due to the substantial number of strings, mostly made of gut, needed frequent tuning.



Figure 14. Allegory of Hearing c1581, Italy. Memorial Art Gallery, New York.

By the second decade of the seventeenth century, however, the lute is repeatedly depicted in a completely different setup, representing the worldly pleasures, or as a metaphor for the concept of *Vanitas*, “the transitoriness and

vanity of human life and earthly matters”.<sup>83</sup> It is around this time that the lute is portrayed often played by drunkards and prostitutes in much more festive circumstances, in locations of questionable reputation like taverns and brothels. This is particularly prevalent in paintings by Flemish artists, where the lute is used as an allegory of sensual love and sex (*Figure 15*).



*Figure 15.* The Procuress, Dirck van Baburen, 1620. Oil on canvas. Museum of Fine Arts, Boston (50.2721).

Nonetheless, this new perception of the lute does not mean the complete disappearance of the portrayal of the lute in domestic or celestial settings in the seventeenth century. The interpretation of the object as a symbol have to be necessarily regarded within the context of the composition, the ambiguity of the semiology of the lute sometimes meaning virtue and other times illicitness is dependant on all the other embedded symbols interacting with each other.

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<sup>83</sup> Burgers, 201.

The nowadays seemingly hidden and elusive messages in the visual arts of the Renaissance were clear for the public for whom they were intended.<sup>84</sup>

In the specific case of studying iconographic sources of Augsburg from the sixteenth century, we have to consider the iconoclastic destruction of religious imagery in art brought by the Reformation. This religious phenomenon narrowed the availability of figurative art, and in certain ways promoted the proliferation of secular art forms. It is not surprising under those circumstances to find a substantial decrease in the number of depictions of lutes played by angels produced in that period.

In addition, the lute is often portrayed as a symbol of the past or the “old traditions”. In that sense it is plausible to think that lutes in old configurations were portrayed even if the instruments produced at the time were already quite different. Therefore, when examining the development in the construction of the lute by means of iconographic depictions, for example with regard to the number of courses, we can only be certain that the instruments portrayed in a particular period were developed before the painting was created and not the opposite.

Once we understand its limitations, and with a reasonable amount of compromising, it can be asserted that iconographic sources provide valuable information with regard to the lute. Therefore, although we cannot verify the tuning of the strings or the sound of a lute through a painting,<sup>85</sup> we can reasonably infer its shape, size, and construction characteristics, as well as the plying technique and body posture of the players. Furthermore, iconography

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<sup>84</sup> Burgers, 195.

<sup>85</sup> Mariagrazia Carlone and Paul Beier, “Lutes, Archlutes, Theorboes in Iconography Source”: *Music in Art*, vol. 30, No. 1/2 (New York: Research Center for Music Iconography, CUNY Spring–Fall 2005), 75.

allows us to understand the social perception of the lute, the context and the ensembles or musical groups in which it was used.

### **Extant lutes**

Conducting a study regarding the physical characteristics of the lutes under adequate scientific methodology is simply impossible. Whilst a scientific study requires hundreds if not thousands of samples under very strict conditions and methodology, the available samples for this historical study are very limited. Because of their delicate construction and the fragility of their materials, most of the lutes from the late Renaissance have not survived the passage of time. The number of extant lutes of the period when Rauwolf was active as a lute maker (between 1577 and ca.1625) is rather small; according to the list published by Klaus Martius<sup>86</sup> only eighty-nine lutes are known to survive at the present time. Those which have survived have often been modified to keep up with musical trends, therefore extending their useful life. Parallel to the production of new instruments, the luthiers of the Baroque period were often occupied with modifying or refurbishing old lutes to meet the requirements of the music of the period. The original necks were replaced with new wider necks to allow an ever increasing number of courses, the pegheads were replaced with neck extensions to mount longer bass courses, internal braces were added and some of the originals replaced, longer bridges were replaced to accommodate more strings, etc. The unfortunate result is that only a handful of the remaining lutes survive without significant modifications. Nonetheless, studying the lutes of the proposed period – however small the pool-sample –

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<sup>86</sup> Lautenweltadressbuch

(<http://www.cs.dartmouth.edu/~lsa/associated/database/dbsearch.php>) consulted on 14/11/2015.



is a valuable source of information with regards to the size, shape, materials, and construction techniques employed for their manufacture.

In addition, the historical authenticity of the extant instruments and their parts is now and again questioned by specialists. A good example of this is the instrument previously mentioned made by Gerle, and dated as ca. 1580.<sup>3</sup> This instrument is commonly regarded in the specialized literature as one of the only two examples of six-course lutes in original condition. However, this lute has been the source of significant controversy, and its authenticity has been both asserted and contested by specialists. Its shape and proportions are atypical for a late sixteenth-century lute, and because there is no date on the label inside the instrument, the date of 1580 can be regarded only as an attribution based on Gerle's active period as a lute maker. This date has been contested at least by David Van Edwards, who, based on its physical characteristics, dates the instrument as ca. 1560.<sup>87</sup> Also, whilst some specialists like musicologist Davide Rebuffa and lute maker Paolo Busato retain this instrument as a fake or at least as heavily altered,<sup>88</sup> others, like the renowned lute makers Stephen Barber and Sandi Harris, are "... convinced that the Gerle [lute] is in completely original condition apart from minor repairs".<sup>89</sup>

The only other example of a six-course lute thought to be in original condition is an instrument by Magno Tieffenbrucker ca.1555, currently part of the collection of Charles Beare. The ascribed date for this instrument makes it too early for the purposes of this study and its authenticity has also been questioned. Rebuffa states that this lute:

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<sup>87</sup> <http://www.vanedwards.co.uk/renlute.htm> consulted on 06/12/2015.

<sup>88</sup> Rebuffa, 171.

<sup>89</sup> <http://www.lutesandguitars.co.uk/hm/cat01.htm> consulted on 06/12/2015.

...has suffered various modifications and some of its parts, like the bridge, are not original. The back of the body, which could be non-original... Also the peg-head and the pegs in ivory left some doubts about their authenticity.<sup>90</sup>

And Ray Nurse refers to both of these examples as displaying:

...enough unusual features that their authenticity, at least in part, has been called into question. Even if original, it is difficult for us to know if they are typical examples from the period.<sup>91</sup>

Even if there was an absolute certainty of their originality, by following the most basic scientific method, a pool-sample of two individual examples of six-course lutes in original condition dating from 1577 to 1612 can hardly be the basis to extract any reliable conclusions as to what the representative characteristics of the six-course lute actually were.

There are only a handful of seven-course lutes from the studied period kept in unaltered condition, and even fewer examples with eight, nine, and ten courses survived to the present day. A substantial majority of these lutes were made either by Vendelio Venere in Padua or by Magnus Tieffenbrucker in Venice, and none of them originate from Augsburg.

Nonetheless, if these alterations and modifications pose a challenge for the study of the characteristics of the lute of the proposed period, the non-altered sections of the extant lutes do provide a significant amount of reliable information with regards to their shape, outline, construction materials, regional differences, and sizes.

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<sup>90</sup> Rebuffa, 170. "... ha subito vari rimaneggiamenti e alcune parti, come il ponte, non sono originali. Il guscio, che potrebbe non essere originale...", "Anche il cavigliere ed i pirolì in avorio lasciano qualche dubbio sulla loro autenticità".

<sup>91</sup> Nurse, 101.



## Chapter 2: Characteristics of the lute in the late-Renaissance

### Body construction

Historical references or descriptions of the construction techniques employed in the manufacture of lutes in the Renaissance are rare. There are only two historical sources describing lute construction; unfortunately, for the scope of this study one of them is too early, by Arnult de Zwolle in ca.1440, and the other is relatively late, Marin Mersenne in his *Harmonie Universelle* of 1636.

The body of the lute can be regarded or understood as a container that holds a specific air-mass. This air-mass will vibrate in resonance with the strings moving the soundboard and thus amplifying the sound and producing a specific timbre. When sculpting the mould or 'form' of a lute, the lute maker is in essence reproducing a solid version of the air-mass that the lute will contain when finished.<sup>92</sup> The shape of the mould, and effectively of the finished body of the instrument, will determine the air-mass distribution, therefore affecting directly the sound produced by the instrument. Different distribution of air-mass will regulate the small sound variances of an instrument: timbre, projection, loudness, colour, etc.

Concurrently, the shape of the body, the materials with which it is made of, and the number of ribs that comprise the back of a lute provide us with information with regard to the period and place in which it was made. Specialized publications divide the late-Renaissance lutes according to their body-shape into two main typologies or schools, assigning them a geographical denomination, the 'Füssen-Bologna' and the 'Venetian' schools.<sup>93</sup> This can be attributed to the fact that most of the known extant lutes of that period were

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<sup>92</sup> Lundberg, 18.

<sup>93</sup> Smith, 65, 69.

made in one of these lute-making centres. Often each of these groups is related to specific renowned lute makers: the Bologna School represented by Laux Maler and Hans Frei, and the Venice School by the Tieffenbrucker<sup>94</sup> family.<sup>95</sup>

According to this nomenclature, the Bologna school can trace its origins to the master lute makers that immigrated from Füssen to Italy at the beginning of the sixteenth century. The main characteristic of the instruments of this school is an elongated body shape with a back constructed of a small number of wide ribs (nine to thirteen) made of maple or sycamore (*Acer Pseudoplatanus*).<sup>96</sup>

The Venice School was started by members of the Tieffenbrucker family, originally from a little town in Bavaria, who also emigrated to Füssen and from there to Venice at the beginning of the sixteenth century. There are two distinctive periods of this school: during the first half of the century, the materials and number of ribs used for the construction of the lutes of this school are very similar to those of the Bologna School, only the shape of the body is considerably rounder and fuller.

By the second half of the sixteenth century a new type of lute surged in Venice and Padua with an innovative construction style.<sup>97</sup> The body of these new instruments is rounder and it is formed by a considerably larger number of ribs (more than twenty-five) typically made of shaded yew,<sup>98</sup> plain yew,<sup>99</sup> or hardwoods imported from India, Africa, and the Americas.

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<sup>94</sup> Also spelled Duiffopruchar and Duiffopruggar.

<sup>95</sup> Tiziano Rizzi, "Il liuto a sei cori", *Liuteria* no.12 (December 1984), 27.

<sup>96</sup> The common names of this wood, sycamore or maple, are interchangeable according to the cultural context, sycamore being the more commonly used in the UK.

<sup>97</sup> Rizzi, "I Liuti a sette, otto e dieci cori", *Liuteria* no.14 (August 1985), 14 - 38.

<sup>98</sup> The pieces of yew used for making the ribs were carefully selected and sawed so in each rib there is a section of sapwood and one of heartwood, creating a striking visual effect.

<sup>99</sup> Only the heartwood of yew.

An obvious problem resulting from grouping the lutes in this arbitrary geographical manner is the omission of the lutes made in other European cities. There is enough evidence to substantiate the fact that prominent lute makers were also active in Rome, Naples, Augsburg, and Füssen, to name only a few. Although the instruments made outside Bologna or Venice often share more characteristics with one or the other school, there are also significant specific characteristics that should be taken into account. These characteristics have not been thoroughly studied, probably because of the smaller number of instruments available.

Some authors like Tiziano Rizzi divide the different lute typologies by their taxonomical characteristics rather than by their geographical denominations: 'Rounded shape' vs 'Elongated shape'.<sup>100</sup>

According to Lundberg,<sup>101</sup> different geographic schools of lute making had specific configurations of materials used for the ribs and 'spacers'<sup>102</sup> of the back:

School/Region	Rib material	Spacer
Bologna	Maple	No spacers
Venice	Shaded yew, plain yew, maple	Black (ca. 1.5 mm)
	Rosewood, ebony	Ivory, ivory-dark wood-ivory
	Ivory	Ebony, dark wood (ca. 1.5 mm)
Padua	Shaded yew	No spacers
	Plain yew	Maple or sycamore (ca. 1.0 - 1.2mm),

<sup>100</sup> Rizzi calls these shapes: *Forma Tondeggiante*, and *Forma Allungata*. See: Tiziano Rizzi, *Liuteria* no.12 Tiziano Rizzi, *Liuteria* no.14.

<sup>101</sup> Lundberg, 24 - 25.

<sup>102</sup> Thin strips of wood or ivory glued in-between the ribs of the back.

		occasionally Ivory or ivory-ebony-ivory
	Cypress	Black spacers <sup>103</sup>
Rome	Shaded yew, maple, ivory	Black spacers
	Plain yew	White wood, poplar

Rebuffa describes the use of spacers for the lutes of this period but with slightly different combinations:<sup>104</sup>

Venice	Rosewood, ebony	Ivory, snake wood (1.5mm)
	Yew, maple	Black spacers (1.5mm)
Padua	Plain yew	Maple and rarely ivory (1.2mm)
	Shaded yew	No spacers
	Cypress	Black spacers

Both Lundberg and Rebuffa, as is common in modern sources, provide descriptions of lutes made only in Italy.

### Number of Courses

One of the most intriguing and recurrent questions with regard to the development of the lute is the number of courses it had during a specific period, and their increase in number throughout time. During the first half of the sixteenth century the most commonly-used lutes had six courses, the first of which was single, the next two double with pairs of strings tuned in unison,

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<sup>103</sup> According to Lundberg, black spacers were made of stained maple or poplar.

<sup>104</sup> Rebuffa, 132.

and the last three double with strings tuned in octaves of which, according to Virdung, the lower string is positioned on the outer part of the course.<sup>105</sup>

The tuning suggested by Praetorius for the first six courses,<sup>106</sup> in which all courses are tuned so there is an interval of a fourth between each of them, except between the third and fourth courses tuned a major third apart, is confirmed in many written sources and printed music, and it is usually termed 'Renaissance tuning'.

It is nearly impossible to ascertain when the seven- or eight-course lute was developed, and certainly the advent of lutes with more strings didn't render all others obsolete, rather they coexisted for long periods and in different regions. Most likely lutes with more than six courses appeared in different places at different times. The existence of lutes with seven courses was first described by Sebastian Virdung as early as 1511 in his treatise *Musica Getuscht*.<sup>107</sup> However, it was not until 1565 that the earlier known example of music for seven-course lute was published: the *Fantasia 4 vocum* by Bálint Bakfark (*Figure 8*), which appeared in the *Harmoniarum Musicarum in Usum Testudinis Factarum Tomus Primus*.<sup>108</sup>

Giulio Cesare Barbetta was one of the most important lute composers of the Italian late-Renaissance and one of the first to write music for seven-course lute in Italy.<sup>109</sup> In his *Libro Primo*, published in 1569, we find two different versions of stringing for a seven-course lute, one in which the seventh course is tuned a

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<sup>105</sup> Uta Henning, "The Lute Made Easy: A chapter from Virdung's *Musica Getuscht* (1511)," *Lute Society Journal* 15 (1973), 24.

<sup>106</sup> Praetorius, 27 (Table 24).

<sup>107</sup> Sebastian Virdung, *Musica Getuscht: A Treatise on Musical Instruments (1511)* by Sebastian Virdung, trans. and ed. Beth Bullard (Cambridge: Cambridge University Press 1993), 150.

<sup>108</sup> Bálint Bakfark, *Harmoniarum Musicarum in Usum Testudinis Factarum Tomus Primus* (Cracow, 1565).

<sup>109</sup> Lundberg, 138-139.



major second below the sixth course, and another with the seventh course tuned a fourth below the sixth course. Similarly, in Antonio Terzi's two Venetian lute books of 1593 and 1598 we find the same two different tunings for the seventh course. However some of the pieces in the same books require only six courses and one of them only five.<sup>110</sup>

In 1574 *Teütsch Lautenbuch*<sup>111</sup> by Melchior Newsidler was published. His previous two books published in Rome comprise music written exclusively for six-course lutes. Newsidler was a renowned lute player and composer from Nuremberg; in 1552 he became a citizen of Augsburg where he performed in the most selected circles of society including private events of the Fugger family. Malcolm Prior attributes Newsidler's later interest in the seven-course lute to "his visit to Italy in 1566, though whether he visited Venice or Padua where the leading makers were based is unknown".<sup>112</sup> He also suggests the possibility of Newsidler being introduced to this new style of lute by an Augsburg lute maker, possibly even Sixtus Rauwolf.

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<sup>110</sup> Court, S. E. (1988). Giovanni Antonio Terzi and the lute intabulations of late sixteenth-century Italy (Thesis, Doctor of Philosophy). University of Otago. Retrieved from <http://hdl.handle.net/10523/466>, 40.

<sup>111</sup> Melchior Newsidler, *Teütsch Lautenbuch* (Strassburg: Bernhart Jobin, 1574).

<sup>112</sup> Malcom Prior, <http://malcolmprior.co.uk/7-8-c-lutes> visited on 03/11/2015.



Figure 16. Six-course lute. *Portrait of a Man Playing a Lute*, Bartolomeo Passarotti, 1576. Oil on canvas. Museum of Fine Arts, Boston, 48.55.

According to Paul Beier, one of the earliest references to an eight-course lute can be found in a letter written by the singer Giulio Cesare to Luigi d'Este, in 1581:

....if one could find an eight course lute, like those that are made to perfection by a German master who is in Padua called Maestro Venere Alberti it would please his highness [the Duke of Ferrara] if you were to present it to him. Since the lute is then to be for my use, I would wish it to be of the usual sort as regards size, and that those bass courses beyond the usual six should be fixed diapasons sounding with one string each, not two, and, in sum, that the lute should be harmonious and silvery, that is, with a clear and sonorous sound, and that the bass

strings should resonate as much as possible. Marenzio, or others who understand these things, will know how to deal with it.<sup>113</sup>

The first example of music published for an eight-course lute is Michele Carrara's *Regola ferma e vera per intavolare nel liuto*, published in 1585 in Rome.<sup>114</sup> It describes an eight-course<sup>115</sup> lute with the seventh course tuned one fourth, and the eighth one fifth, below the sixth course.<sup>116</sup> The same tuning for an eight-course lute was published in 1601 by Scipione Cerreto in his *Della prattica musica vocale et strumentale*.<sup>117</sup>

The constant effort to expand the register of the lute towards the bass by adding lower strings had a substantial and technological problem. As wound strings were not developed until the second half of the seventeenth century,<sup>118</sup> in order to achieve lower notes with the same diapason, the added bass string had to be significantly thicker, producing consequently a rather poor, dull, and short-lived sound. This problem was already present in six-course lutes and was only accentuated with thicker strings of the seventh and eight courses. In order to mitigate this, the second string of the lower courses<sup>119</sup> was tuned an octave higher, enhancing the harmonics of the note and therefore making it brighter.

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<sup>113</sup> P. Beier. "Some Remarks on the Seven-Course Lute Music in the Sienna Manuscript", Lute Society of America Quarterly vol. XLIV no. 2, 2009.

<sup>114</sup> Michele Carrara, *Regola ferma e vera per intavolare nel liuto* (Rome, 1585).

<sup>115</sup> All eight courses are double.

<sup>116</sup> Mimmo Peruffo, "Lute gut bass strings after c. 1570 (7; 8; 9; 10 and 11 course lutes)", <http://ricerche.aquilacorde.com/wp-content/uploads/liuto-en.pdf> consulted on 17/01/2017.

<sup>117</sup> Scipione Cerreto, *Della prattica musica vocale et strumentale : opeera necessaria a coloro, che di musica si diletmano, con le postille poste dall'autore a maggior dichiarazione d'alcune cose occorrenti ne' discorsi* (Naples, 1601), 315.

<sup>118</sup> The earliest surviving historic reference to overspun strings dates back to 1664. It appeared in an Advertisement on the last page of John Playford's *Introduction to the skill of Music*, second ed. (London, 1664).

<sup>119</sup> Usually starting at the fourth course, although some sources suggest starting at the fifth.

Contrary to this practice, in his publication, Carrara specifies the use of courses in which both strings are tuned in unison in order to avoid the higher octaves clashing the harmony with the notes played on the first courses. This practice was explained by Le Roy as early as 1574:

Where those strynges that stande twoo and twoo together, bee sette in one Tune, and not by eightes, whiche thei doe for a perfectiō of harmonie, in auoydyng many vnissos, whiche those eight would cause.<sup>120</sup>

During the last decades of the sixteenth century the addition of strings continues with the appearance of instruments with nine and ten courses. These extra courses do not have an impact on expanding the register towards the bass as with the previous additions, instead the ninth and tenth courses function to fill the gaps between the sixth and the eight courses; that is, the lowest note is the same but instead of having an interval of a major fourth between sixth and seventh courses, the four lower courses descend diatonically to the tenth course.

Nevertheless, the nine- and ten-course lutes do not appear to be as widespread as the seven- or eight-course lutes in published music, iconography or in extant instruments. The first publications for nine-course lutes appeared at the beginning of the seventeenth century, examples can be found in *Le Trésor d'Orphée* by Antoine Francisque published in 1600,<sup>121</sup> the *Thesaurus Harmonicus*

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<sup>120</sup> Adrian Le Roy, *A briefe and plaine instruction to set all musicke of eight diuers tunes in tablature for the lute with a briefe instruction how to play on the lute by tablature, to conduct and dispose thy hand vnto the lute, with certaine easie lessons for that purpose*, (London: James Rowbothome 1574), unnumbered page between 41 and 42.

<sup>121</sup> Antoine Francisque, *Le Trésor d'Orphée, livre de tablature de luth contenant une Susane un jour, plusieurs fantaisies, préludes, passemaises, gaillardes, pavanés d'Angleterre, pavane espagnolle, fin de gaillarde, suites de bransles tant à cordes avalées qu'austres, voltes & courantes mises par Antoine Francisque*. – (Paris: Pierre I Ballard, 1600). 32 f.

of Johan Baptiste Besard in 1603,<sup>122</sup> and John Dowland's *Lachrimæ or seaven teares* in 1604.<sup>123</sup>

Iconographic depictions of lutes with ten courses first appear around the second decade of the seventeenth century. A good example of this is *The lute player*, painted by Orazio Gentileschi in 1612 (Figure 17).



Figure 17. Ten-course lute. *The lute player*, Gentileschi, 1612. Oil on canvas. The National Gallery of Art (Washington, D.C.) 1962.8.1.

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<sup>122</sup> Johan Baptiste Besard, *Thesaurus Harmonicus* (Cologne, 1603).

<sup>123</sup> John Dowland, *Lachrimæ or seaven teares figured in seaven passionate pavans, with divers other pavans, galliards and allemands, set forth for the lute, viols, or violons, in five parts*, (London: John Windet, 1604).

According to Rizzi,<sup>124</sup> towards the end of the sixteenth century the more commonly used lutes would have had seven or eight courses. That does not imply the complete disappearance of the six-course lute; iconographic sources depict these well into the seventeenth century (*Figure 23*), and music for six-course lute continued to be published.

Depictions of lutes of the same period seem to corroborate this assertion. Michelangelo Merisi da Caravaggio painted *The lute player* and *The musicians* the same year, in 1595. Both works portray lutes being played with exquisite attention to detail; in *The lute player* (*Figure 18*) we can even see a crack on the body of the lute, and on the sheet music the song by Jacques Arcadelt, "You know that I love you". It is then clearly not a mistake that the lute of that painting is a six-course instrument and the one depicted in *The musicians* a seven-course (*Figure 19*).

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<sup>124</sup> Tiziano Rizzi, *Liuteria* no.12 (December 1984), 26.





Figure 18. Six-course lute. *The lute player*, Caravaggio, 1595. Oil on canvas. Hermitage Museum. ART7224



Figure 19. Seven-course lute. *The musicians*, Caravaggio, 1595, Oil on canvas, Metropolitan Museum of Art, New York, 52.81.

Further confirmation of the coexistence of lutes with all sorts of numbers of courses can be found in the *Stuttgarter hofekapelle Inventarium instrumentorum musicorum* in which we find records of lutes assigned to specific musicians. On this lists we find that a single lutenist would have several lutes of different sizes with a different number of courses. For example, Georg Reyßmüller had assigned:<sup>125</sup>

- A *grosse* bass with eleven strings.
- A bass lute with eleven strings.
- A descant lute (number of strings not specified).
- A middle lute with twelve strings.
- A middle lute with fifteen strings.
- A new lute with sixteen strings.
- A lute with sixteen strings.

The list of instruments assigned to lutenist Tiberio Palamanuto does not include descriptions of size:

- Two lutes one with twenty-four and other with sixteen strings.
- Three lutes with six, seven, and eight courses.
- Two lutes with eight courses.
- One lute with twenty-three strings.

In 1590, Benedict Ruinoth replaced Georg Reyßmüller as the principal lutenist of the chamber orchestra and Reyßmüller's lutes were then entrusted to Ruinoth, with the addition of "A new lute... with 15 strings".

Of particular interest is the use of even numbers of strings, which would suggest all of the courses were double, contrary to the more commonly

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<sup>125</sup> Golly-Becker, 115, 216, 217, 232.



accepted configuration with the first course single and the rest double. The twenty-three- and twenty-four-string instruments are perhaps not lutes but chitarrone or archlutes, which at the time were starting to become popular, particularly in relatively large music ensembles like chamber orchestras, where they would reinforce the bass line together with the harpsichord.

The first pieces written specifically for ten-course lute appear in Kapsberger's *Libro Primo d'intavolatura di Lauto* published in 1611. In the same publication there is also one piece for six-course lute, seventeen pieces for seven-course, one piece for eight-courses, twelve pieces for ten-courses, and even one piece that appears to be for eleven-courses.<sup>126</sup>

Likewise, in Dowland's publications of music for lute, his first three *Booke of Songes or Ayres* (1597, 1600, and 1603) are written for seven-course lute, but his 1604 *Lachrimae or Seaven Teares* is for nine-course lute, and his *A Pilgrimes Solace* (1612) for eight-course lute.

In 1636, Mersenne in his *Second Book of String Instruments* on the Proposition XII endeavoured "to explain the tablature of the lute, and all its tunings..."<sup>127</sup> whilst describing the tablature Mersenne makes evident the coexistence of ten and six-course instruments.

I assume then first of all that the lute is strung with ten courses of strings... or preferably a lute of six courses... which represents the simplicity of the old lute...<sup>128</sup>

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<sup>126</sup> The Seventh Currant on page 29 of the 1611 edition of Kapsberger's *Libro Primo d'intavolatura di Lauto* has one single note on bar 61 that could be read as an eleventh course. There is no clear indication as to what the tuning of this note could be. Some editions interpret this note as a 9, rather than 11.

<sup>127</sup> Mersenne, 116 – 130

<sup>128</sup> Mersenne, 116.

Praetorius in chapter 24 of *De Organographia* explains with regards to the number of courses that:

Originally lutes had only four courses of double strings tuned *c f a d'* like the guitar. Later, one more upper course was added, giving *c f a d' g'*... Later a sixth course was added at the bottom, the *Γ ut*, that is, then a seventh, the *F fa ut*. Over the years lutenists have made additions to the point that we can now find lutes with eight, nine, and sometimes even ten, eleven, or more courses. There is no need to give here the tuning of the seventh, eighth, and ninth courses – every player can tune them as he pleases, depending on his custom, or on the particular requirements of the piece.<sup>129</sup>

Nonetheless, Praetorius does provide a table including the tuning for an ordinary alto lute with six to nine courses as: *g', d', a, f, c, G, F*, for the seven-course lute, *g', d', a, f, c, G, F, C* for the eight-course, and *g', d', a, f, c, G, F, D, C* for the nine-course lute.

The manuscript *Instrumentalischer Bettlermantl*, published most likely in or near Augsburg by the mid-seventeenth century,<sup>130</sup> includes an illustration describing the tuning of the strings for three different sizes of lute and their fretting. The portrayed lutes are six-course instruments, but in the first of them whilst numbering the strings it includes extra lines for further three courses, evidently signalling a nine-course instrument in which the lower three courses are not fretted (*Figure 20*).

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<sup>129</sup> Michael Praetorius, *Syntagma Musicum. 2, De Organographia, Parts I and II; Translated and Edited by David Z. Crookes*. Early Music Series; 7. (Oxford: Clarendon Press, 1986), 57.

<sup>130</sup> The authorship and date of publication have not been established at the present time. According to Patricia Campbell in her article "Musical Instruments in the Instrumentälischer Bettlermantl - A Seventeenth-Century Musical Compendium" *The Galpin Society Journal*, Vol. 48 (Mar., 1995), pp. 156-167. "Textual evidence for provenance and dating in the manuscript includes several references to Augsburg (e.g. ff.5 and 23) and many references to dated, published works: the latest date given is 1633".

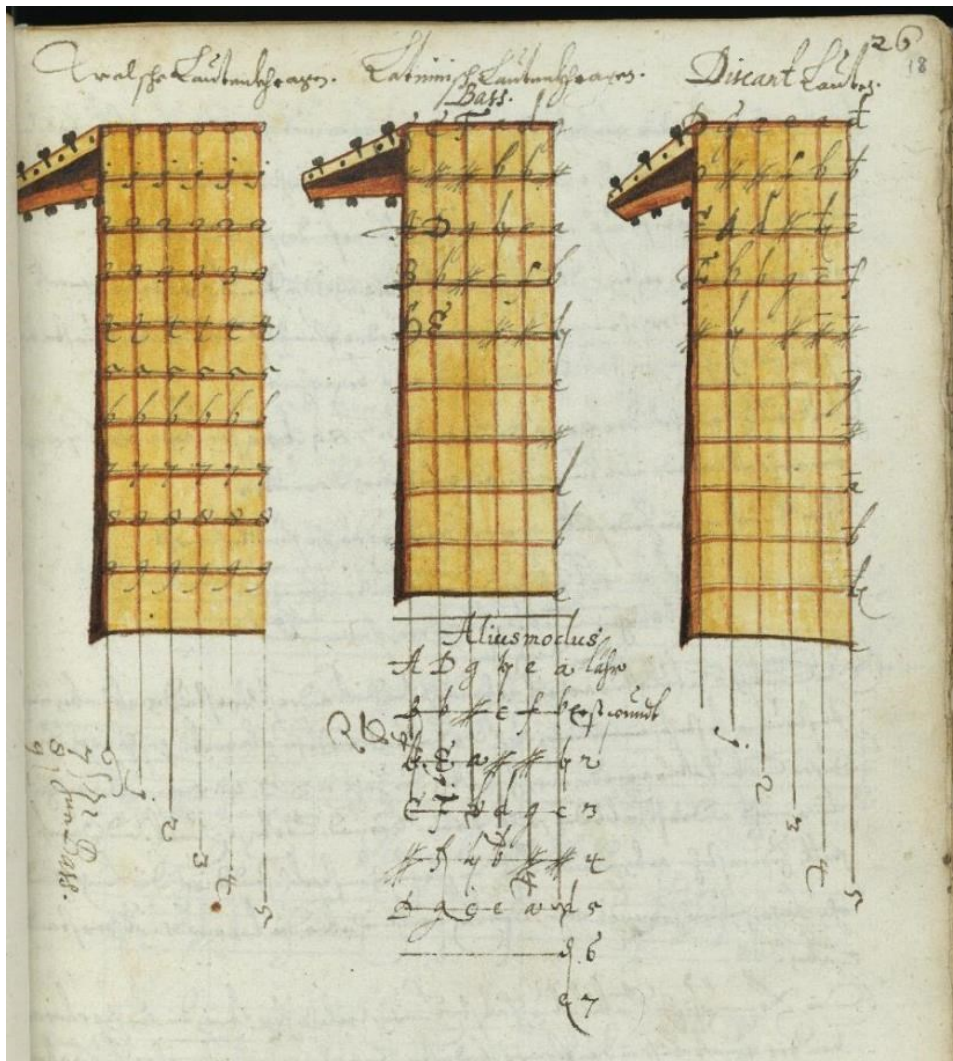


Figure 20. Tuning of the lute. Instrumentalischer Bettlermantl f.18r, ca. 1640. University of Edinburgh, CRC Dc.6.100.

Iconographic sources from around the second decade of the seventeenth century often depict ten-course lutes with the first string mounted on a *rider* on the pegbox. This device allowed a relatively smaller pegbox to house the large number of pegs. Also the rider could be added to a nine-course lute to turn it into ten-course without undergoing major renovation work.

The coexistence of lutes with different number of courses during the first half of the seventeenth century is confirmed in iconography, often paintings of the same period and even by the same artist depict instruments of different characteristics. A good example of this is the Dutch artist Hendrick Jansz ter Brugghen, who repeatedly portrayed the same model playing the lute. This

musician appears playing an eight-course (*Figure 21*) as well as a ten-course lute (*Figure 22*). This can be attributed to a mistake by Ter Brugghen but it is rather unlikely. Around the same time Ter Brugghen painted these lutes, Dirck van Baburen portrayed a musician playing a six-course lute (*Figure 23*), corroborating its continued existence well into the seventeenth century.



*Figure 21. Eight-course lute. Lute Player Singing, Hendrik Ter Brugghen, 1620. Oil on canvas, Staatsgalerie, Stuttgart.*





Figure 22. ten-course lute. *The Duet*, Hendrick Terbrugghen, 1624. Oil on canvas, Louvre, Paris.



Figure 23. six-course lute. *The Lute Player*, Dirck van Baburen, 1622. Oil on canvas, Centraal Museum in Utrecht (Inventory number: 11481).





Figure 24. Ten-course lute. *Young Man with a Lute*, Manfredi, early seventeenth century. Oil on canvas. Hermitage Museum.

It can be asserted that there is no single approach for all lutes during this period, although there is an evident progression towards a larger number of courses, it is also true that the coexistence of lutes with six to ten courses is evident and widespread. Nevertheless, this does not substantiate the manufacture of six-course lutes during the seventeenth century, as it is more likely that new lutes were made to meet the latest musical trends.

## Strings

At the present time there are no known extant examples of original lute strings from the sixteenth or seventeenth centuries. And very little information regarding their characteristics or the technology used for their manufacture is provided in treatises and books of the time. Two examples of the statutes for the Guild of String makers of the seventeenth century, one from Rome and the other from Naples, have been recently discovered by Mimmo Peruffo,<sup>131</sup> and although they are a source of valuable information, they also confirm that the “string makers’ secrets were carefully guarded”.<sup>132</sup> As is often the case with guild’s statutes, these centre their attention on the restrictions and regulations of the market and membership, rather than the specifics of the string production and manufacture. As with the lutes and their construction, an alternative source of information to help us understand the strings of the period is the iconography, although as previously explained this resource has implicit limitations inherent to its nature.

Studying the few extant bridges of the period can also provide information with regards to the strings. The marks and notches left by the strings on the wood of the bridge can help us determine the way the strings were attached to the bridge, providing also an idea of the thickness of the strings. By measuring the holes intended for the strings in the bridge, we can determine the maximum diameter of the strings, at least of the bass courses, which apparently was significantly thinner than the strings produced today, in order to achieve the intended pitch. Further research is currently taking place among the modern makers of historical strings.

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<sup>131</sup> Mimmo Peruffo, “The mystery of gut bass strings in the sixteenth and seventeenth centuries: The role of loaded gut” *Lute Society of America Quarterly* Vol. XXIX ° n.2 (May 1994), 5-14.

<sup>132</sup> *Ibid.*



Contrary to what is the practice today, in which strings are made specifically for an instrument according to the desired string tension, length, and pitch, the availability of strings in the Renaissance was decidedly more limited. Since the length of the string and its gage dictated the highest pitch in which the string could be tuned, the size of the instrument was dependent on the string and not vice versa. According to Peruffo:

...the ancient lute makers designed their instruments... starting from the mechanical and acoustical properties of the available gut strings, and not the other way round.<sup>133</sup>

The instrument maker would design and create a lute to play a specific note at a desired pitch according to the strings that were available on the market, particularly the *cantino*, the breaking point of which would determine the maximum operational tension. A good example of this, although slightly late for the studied period, can be found in Playford's *Introduction to the skill of music*, in which he explains:

When you begin to Tune, raile your Treble or sallest siring as high as conveniently it will bear without breaking.<sup>134</sup>

Similarly, in order to obtain a desired note with a given diapason, the strings had to be thicker, which directly affected their tension and sonority. These thicker strings have a very dull sound, therefore a second string tuned an octave higher was necessary to accentuate the harmonics, enhancing the timbre.

By the end of the sixteenth century the desire for lower and richer notes, impeded by the poor sound quality of these thick strings, demanded design changes both in the construction of the lute and in the technology to produce

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<sup>133</sup> Mimmo Peruffo, *The lute in its historical reality*, (Tg Book: 2012), 3.

<sup>134</sup> J. Playford, *Introduction to the skill of Music* (London, 1664), 85.

better strings. As an alternative to having thicker strings, lowering the pitch of a note could be achieved by increasing the bass string length.<sup>135</sup> This concept gave birth to a number of instruments like the archlute and the theorbo, to name only two. Nonetheless, the appearance of these new instruments did not mean the obsolescence of the lute, but rather a long lived coexistence.

## Bridge

The number of original bridges of the studied period is rather limited;<sup>136</sup> most of them were made in Padua by Wendelio Venere, and have different configurations of courses. However, they have a few common characteristics: the height and width taper towards the treble side; there is no saddle nor any other means to stop the strings, so they are wrapped around and knotted to themselves on the back of the bridge; and it is the loop of the string that stops the vibrating length. Due to the absence of a saddle like the one commonly found in classical guitars, the string height at the right-hand end of the string is determined by the height of the bridge.

Bridges are made of a single piece of wood,<sup>137</sup> often stained or ebonized,<sup>138</sup> and have decorative ends in the shape of delicate scrolls similar to those found in the bridges of clavichords and harpsichords of the same period,<sup>139</sup> alternatively they are shown as round volutes, or carved flowers in early iconographic depictions (*Figure 16, 25, 26*).

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<sup>135</sup> The greatest range that can be achieved with all-gut stringing over a single diapason is two octaves and a fifth, any larger compass requires either different types of strings, or a second longer diapason.

<sup>136</sup> Lundberg, 48.

<sup>137</sup> Often pear, apple, or cherry wood is used for this purpose.

<sup>138</sup> Ebonizing wood is achieved through a chemical reaction (iron acetate) that makes the material turn black.

<sup>139</sup> Lundberg, 48-49.

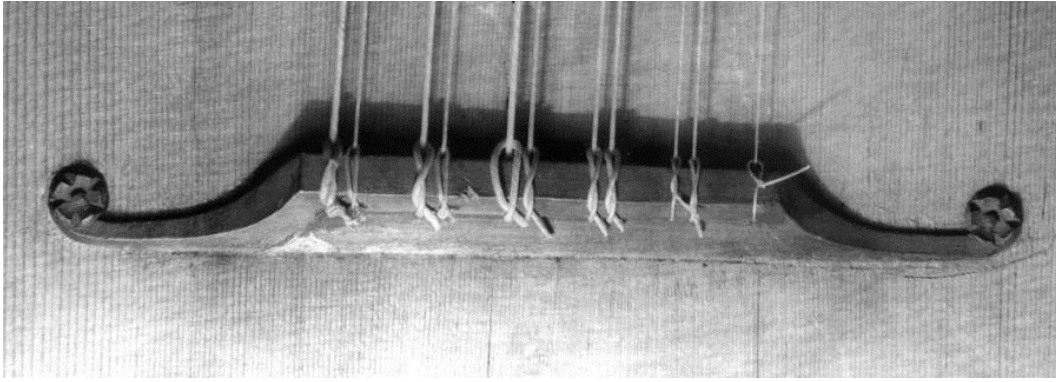


Figure 25. Detail of the bridge of a lute by Georg Gerle, Kunsthistorisches Museum, Vienna, No.A 35. Photographed by David Van Edwards.

The spacing of the courses and the strings between each of the courses is decided by the ergonomics of the hands of the player, and by the necessary distance to avoid the strings vibrating against each other whilst playing.



Figure 26. Bridge with round volute decorative ends. *Playing Putto (Musician Angel)*, Rosso Fiorentino, 1518.

The bridge was glued in at an angle and often off-centre with respect to the central axis of the body, probably to compensate the difference in intonation due to the different thickness of the strings.

The position of the bridge within the soundboard impacts the sound a lute will produce. According to Mersenne, the location of the bridge can be defined by dividing the length of the soundboard into eight equal parts, starting at the bottom. The first two sections are “divided... into three other equal parts, the said bridge is glued upon the second part which is situated above”.<sup>140</sup> This description is supported by the physical evidence found on extant instruments where the bridge is always glued close to the described area. Similarly in iconography, although the perspective and painting techniques of the time do not allow for exact measurements, the proportions seem to agree roughly with Mersenne’s description (*Figure 27, 28*).

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<sup>140</sup> Mersenne, 78.



Figure 27. Diagram showing the position of the bridge as described by Mersenne on a painting. *Young Man with a Lute*, Manfredi, early seventeenth century. Oil on canvas. Hermitage Museum.





Figure 28. Diagram showing the position of the bridge as described by Mersenne. *Portrait Nicholas Lanier with The Liberation of St. Peter* by Hendrick van Steenwyck II, ca.1613, oil on canvas, transferred from panel. Private collection, UK.

## Neck and frets

As with the bridges, only a very small number of lutes arrive at the present time with their original necks. Also similarly to the bridge, the neck is glued to the body with a slight angle towards the bass side. This is done to shorten the string length of the bass strings, thus compensating for the intonation problems caused by the different thicknesses of the strings.

Most of the extant original necks are made of a light wood core (poplar, spruce, pine, or fir),<sup>141</sup> their back veneered with a hardwood like ebony, and an applied hardwood fingerboard on the front.<sup>142</sup> This construction allows for very light necks whilst the veneer and fingerboard provide a strong structural reinforcement. This is very important for the balance of the instrument since the pegbox with its large number of pegs is by far the heaviest part of the lute, a heavy neck affecting greatly the playability of an instrument.

The veneer of the back of the neck is either applied as a single piece of wood or ornately with spacers like those used between the ribs. Decorative inlays on the neck are not a common characteristic of the lutes in this period, although they become a recurrent feature in theorboes and archlutes from around 1620.<sup>143</sup>

The width of the neck is determined by the string-band, which is the trapezoid formed by the first and last strings, the bridge, and the nut (*Figure 29*) and by the ergonomics of the musician's hands. The width of the string-band is dependent on the number of courses, and the string length. However, in lutes with nine or ten courses the width of the neck at the joint with the body is sometimes narrower than the string-band, this is because the lower courses are used as

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<sup>141</sup> Lundberg, 54.

<sup>142</sup> Smith, 86.

<sup>143</sup> Lundberg, 56.

drone-notes not meant to be stopped with the left hand, and therefore there is no need for them to be contained within the fingerboard.



*Figure 29. String-band.*

The thickness of the neck is much more reliant on ergonomics, regardless of the size of the instrument or the number of courses; it is the hand of the musician that determines how thick the neck can be. The necks of the lutes of this period have a round cross section with a flat fingerboard, and the thickness and width of the neck taper down towards the pegbox.

Although there are lutes of various sizes, the neck thickness still relates in a direct way to the human scale, and most historical lutes with original necks have similar thicknesses, between 28 and 35mm at the joint with the body and tapering down to about 18 to 22mm at the pegbox end.

The length of the neck is somewhat more complex to establish. Treatises and iconography explain this in different ways. According to Mersenne:



...it must be observed that the neck... ought to be of the same length as the interval from the beginning of the sound-board to the middle of the rosette.<sup>144</sup>

Mersenne also describes the length of the neck in comparison to the length of the lute's body, which should be eight parts and the neck five parts. That is, if the body length is divided in eight equal parts, the centre of the rosette should coincide with the fifth division from the bottom.

The neck of the lutes of this period is meant to hold eight frets. In Robert Dowland's *Varietie of Lute Lessons* published in 1610, his father, John Dowland, wrote a sort of introduction entitled *Other Necessary Observations belonging to the Lute*. In it John Dowland quotes Hans Gerle's *Musica teusch*, published in 1532, in which Gerle suggest the use of seven frets. Dowland, however, clarifies that "yet presently after there was added an eighth fret... and all the Lutes which I can remember used eight frets..."<sup>145</sup>

In the same introduction Dowland also states that:

...the necks of lutes were lengthned, and thereby increased two frets more, so as all those Lutes which are most receiued and disired, are of tenne frets.<sup>146</sup>

Therefore, if the position of the bridge has been established, the length of the neck can be determined by the string length. The neck/body joint usually coincides or is very near to the location of the ninth fret. Georg Leopold Fuhrmann, in his *Testudo Gallo-Germanica*, published in 1615, provides somewhat contradictory evidence with regard to this assertion. The depiction of the ten-course lute on the title page has eight frets tied to the neck, and the

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<sup>144</sup> Mersenne, 48.

<sup>145</sup> Robert Dowland, *Varietie of Lute-lessons*, (London, 1610), D2.

<sup>146</sup> Ibid. Lutes with ten frets tied to the neck as described are common on iconographic sources of the early seventeenth century. See *Figure 104*. Lute Player. Theodor Rombouts, c. 1620. Oil on canvas. Philadelphia Museum of Art (PMA. Cat. 679).

joint with the body occurs precisely at the eighth fret, however, there are nine letters indicating the fret names that will be used in the tablature (Figure 30).

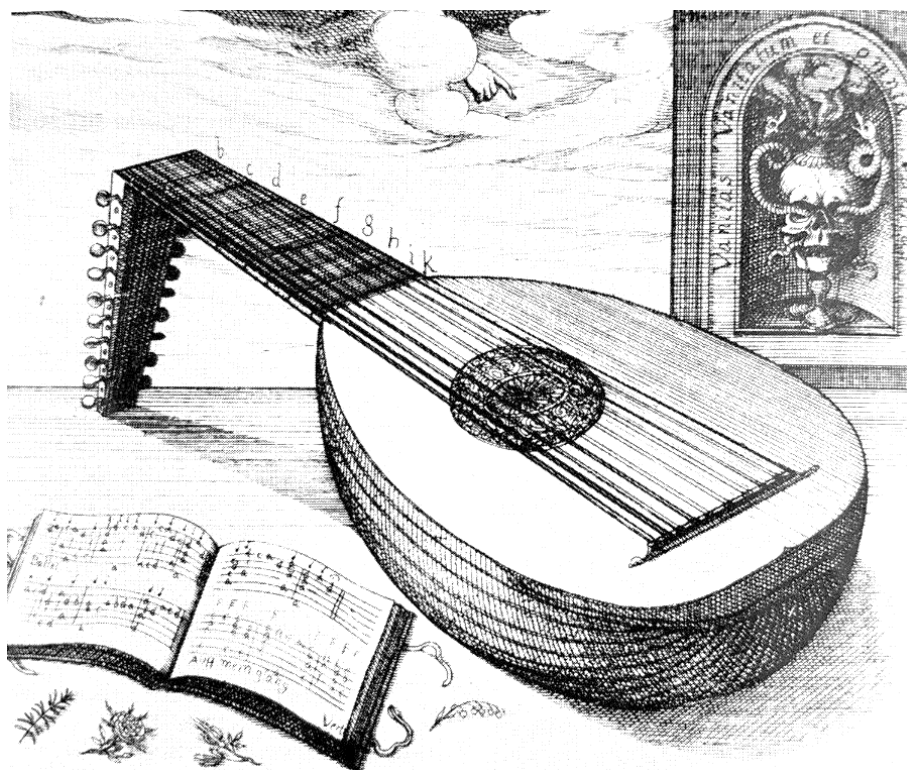


Figure 30. Georg Leopold Fuhrmann, *Testudo Gallo-Germanica*, Nuremberg 1615. Ex. Munchen, Staatsbibl.).

A later, yet similar example can be found in Mersenne's *Harmonie Universelle*. Figure 7a shows the lute has also ten courses and nine frets tied to the fingerboard, and the joint with the body seems to allow for at least one more fret (Figure 31).

A further illustration in the same book portrays quite a different lute, this time a six-course instrument with only eight frets tied to the neck, and the body joint at the ninth fret (Figure 32).

In addition to the eight gut frets tied to the neck, the early years of the seventeenth century saw the advent of wooden frets glued to the soundboard.

Also, in *Varietie of Lute Lessons*, John Dowland attributed their invention to the English lutenist Mathias Mason.<sup>147</sup>

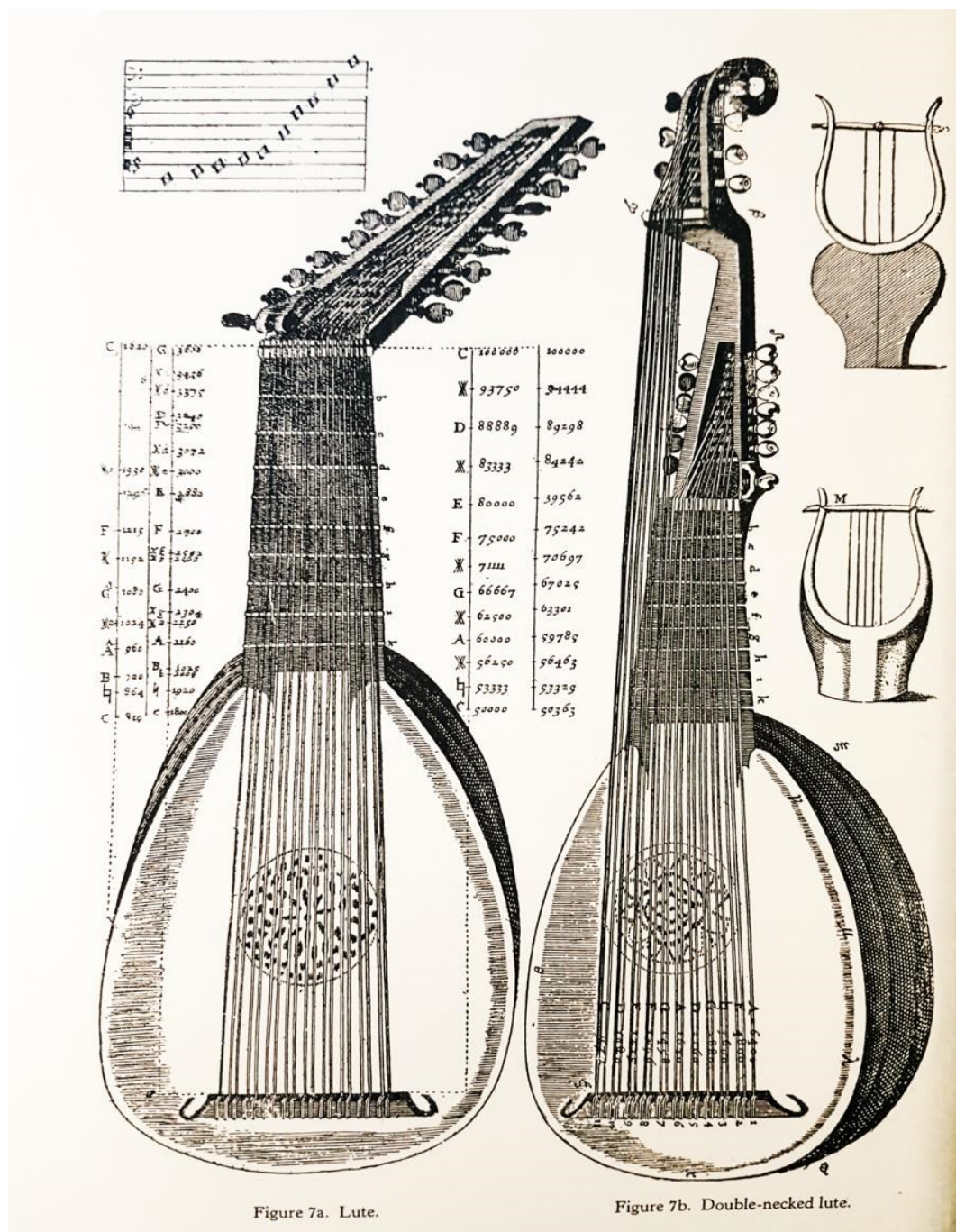


Figure 31. Figure 7a showing the lute. Mersenne, *Harmonie Universelle*, 1636.

<sup>147</sup> <http://www.vanedwards.co.uk/month/nov00/month.htm> consulted on 08/01/2017.

PROPOSITION XII

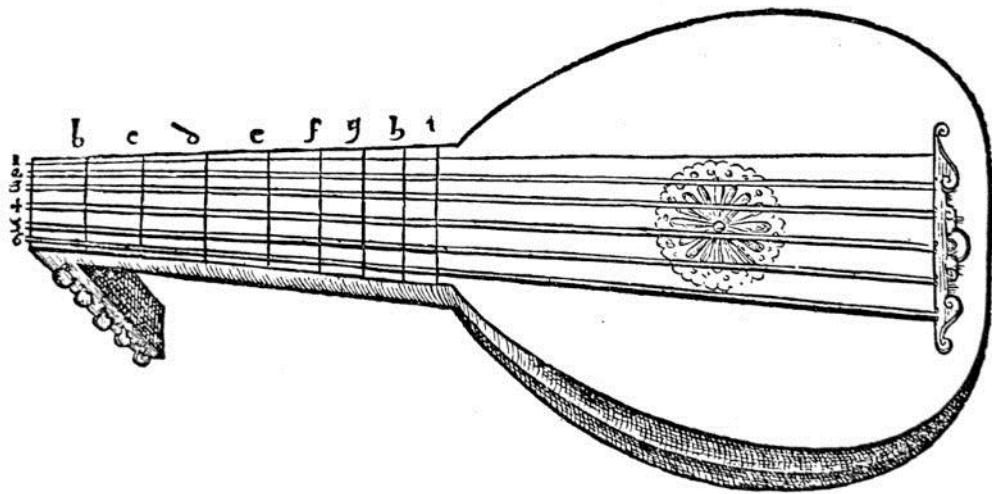


Figure 11. Lute, with six courses of strings.

Figure 32. Figure 11 portraying a six-course lute, Mersenne, *Harmonie Universelle*, 1636.

But yet as Plautus saith, Nature thirsting after knowledge, is alwayes desirous to invent and seeke more, by the wittie conceit (which I have seen, and not altogether to be disallowed) of our most famous countriman M. Mathias Mason Lutenist, and one of the Groomes of his Maiesties most honourable Privie Chamber, (as it hath ben told me,) invented three frets more, the which were made of wood, and glued upon the belly...<sup>148</sup>

Mathias Mason was as an English lutenist and composer in the court of Queen Elizabeth since 1580, and in 1603 he was promoted to her Privy Chamber. Therefore it is conceivable that the invention of these wooden frets happened no earlier than that year.

The few extant original pegboxes of the period all possess a trapezoidal shape and similar proportions. Since the dimension of the widest part of the pegbox is determined be the width of the neck, as the number of strings increases, the upper side of the trapezium gets smaller. Their construction is in all cases

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<sup>148</sup> Robert Dowland, D2.



similar, the walls are usually made of sycamore or beech (*fagus sylvatica*), often stained or veneered to match the colour of the neck, and the back is solid wood (either the same wood used for the pegbox walls or the same wood as the veneer on the neck). Pegboxes with pierced decorative backs appear with the eleven and thirteen-course lutes.

It is very challenging to establish if a peg is original, since they often get replaced, or are lost. Most paintings of the period feature one of three models of pegs' heads: a simple round-shaped (the most prevalent model), heart-shaped, and winged-shaped (*Figure 33*).



*Figure 33.* Detail of pegs in iconography. Heart-shaped (left) see *Figure 16*, round (right) see *Figure 18*, winged-shaped (below), see *Figure 20*.

## Rosette

As accurately described by Hellwig, “The most decorative part of the lute is the rose”.<sup>149</sup> Carved out of the soundboard, their geometric patterns are complex and beautiful, yet they can be constructed by using only a compass and ruler (Figure 34).

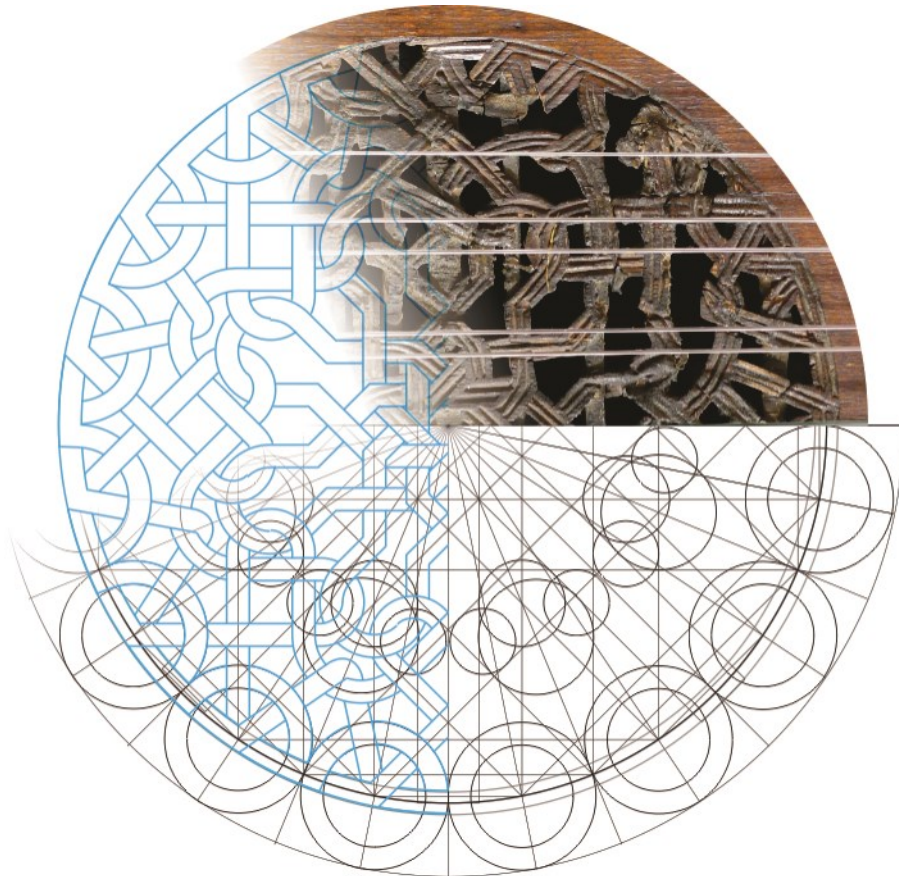


Figure 34. Diagram showing the different steps in drawing a rosette with compass and ruler.<sup>150</sup>

Most of the rosettes from the extant Renaissance lutes are based on only a few designs<sup>151</sup> repeated over and over throughout Europe for a rather extended period. At least three most common patterns are seen in the earliest extant lutes

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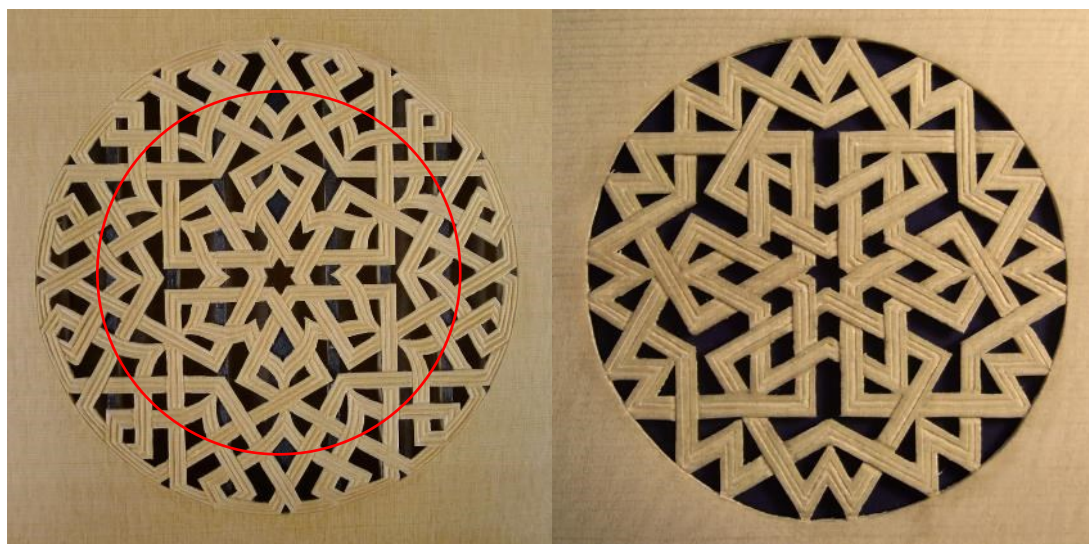
<sup>149</sup> Friedemann Hellwig, Lute Construction in the Renaissance and the Baroque, *The Galpin Society Journal*, Vol. 27 (May, 1974), 25.

<sup>150</sup> The compass and ruler used to draw this example are digital versions of the analogue drawing tools.

<sup>151</sup> Smith, 87.

of the sixteenth century up to the very last known examples of the eighteenth century. This has led to the assumption that lute rosettes were not actually carved by the individual lute makers, but produced in bulk by specialized craftsmen who would sell them pre-cut to the luthiers.

Often these patterns are shortened when the soundhole is smaller, thus showing only a section of the complete pattern (*Figure 35*). However, it is evident that the pattern was also scaled up or down according to the specific needs of the luthier. That is, the decrease in size is not always followed by the specific section of the pattern present on a rosette. In addition, the basic patterns are sometimes embellished by the addition of ornamental elements, like vines, etc.



*Figure 35.* Two rosettes with the same pattern, one featuring the full pattern (left), and the other a shortened version of it (right). The red circle shows the section of the pattern featured in the shortened version.

These intricate geometric patterns are tantalizing, and a lot has been written about their semiology. They have been interpreted as “the permeation of the visible and the invisible world, represented by two triangles fitted into each other”,<sup>152</sup> or that they aim “to express the inexpressible laws of the cosmos in

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<sup>152</sup> Ibid.

mathematical form"<sup>153</sup> and bear "the fundamental characteristics of the mandala... found not only in Tantric Buddhism..."<sup>154</sup> Other sources suggest the depiction of "the cosmos in a circular microcosm, the metaphysical in a physical form, harmony in the form of geometrical proportions and patterns, and the unity if the human Self with the universe"<sup>155</sup> or as a representation of the "four elements, the four seasons and the four bodily humours"<sup>156</sup> as well as the twelve signs of the "...zodiac, thus symbolizing in the same figure both the eternal revolution of the heavens and also the annual unit of time".<sup>157</sup>

Nonetheless, the meaning and reasoning behind the geometric patterns of the rosettes is unknown, and all these poetic, philosophical, semiotic and semantic interpretations are simply conjectural. There is no evidence to substantiate the reasoning behind the carved patterns of lute rosettes.

Another source of constant speculation is the origin of the rosettes' designs. The geometric patterns that form the lute rosettes are commonly attributed to the Arabic culture. Hellwig explains that:

...everybody knows, the lute is no European invention but was taken over from the Arabs as a fully-developed instrument; the ornamentation of the rose likewise survived the transition from Islam to the Christian Occident.<sup>158</sup>

Nonetheless, none of the historical *ouds* held in public and private collections, nor the ones portrayed in iconography, have a carved rosette with any of the commonly used patterns found in European lute rosettes.

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<sup>153</sup> Ibid.

<sup>154</sup> Ibid, 88.

<sup>155</sup> Ibid, 89.

<sup>156</sup> Robin Headlam Wells, "Number Symbolism in the Renaissance Lute Rose", *Early Music*, Vol. 9, No. 1, Plucked-String Issue 1 (Oxford University Press: January, 1981), pp. 32-42.

<sup>157</sup> Ibid.

<sup>158</sup> Hellwig, 25. See also: Friedemann Hellwig, "On the Construction of the Lute Belly", *The Galpin Society Journal*, Vol. 21 (Mar., 1968), pp. 129-145.



Similarly, Lundberg maintains that:

In the soundhole rosettes of the European lutes we find a clear link with their Arabic precursors.<sup>159</sup>

Lundberg points to the famous book from the nineteenth century *Les Éléments de l'Art Arabe*.<sup>160</sup> On this book Bourgoïn depicts a very similar pattern to the six-pointed star, which is the most common design in lutes' rosettes (*Figure 36*). This pattern is grouped by Bourgoïn with the "Dodecagonal Family"<sup>161</sup> and he describes it as:

PL. 84. Plan trigone. Vertices describe circumferences with a radius equal to  $\frac{1}{3}$  of the side, and lead the diagonals into 4 by 4 divisions. Then, at the centre of the trigone, draw a retracted hexagon, the long sides of which intersect the prolonged lines of the rosette.<sup>162</sup>

According to Bourgoïn:

The Arab art proceeds from within outward, it creates problems and translates them graphically by pencil and compass.<sup>163</sup>

Certainly the rosette patterns show the influence from geometric ornaments found in Arabic art; however, there is no actual evidence to substantiate that the specific patterns found in lute rosettes had their origin in the Arab tradition.

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<sup>159</sup> Lundberg, 40.

<sup>160</sup> Jules Bourgoïn, *Les Éléments de l'Art Arabe*, (Paris, 1879).

<sup>161</sup> Bourgoïn, 24.

<sup>162</sup> Ibid.

<sup>163</sup> Ibid, 6.

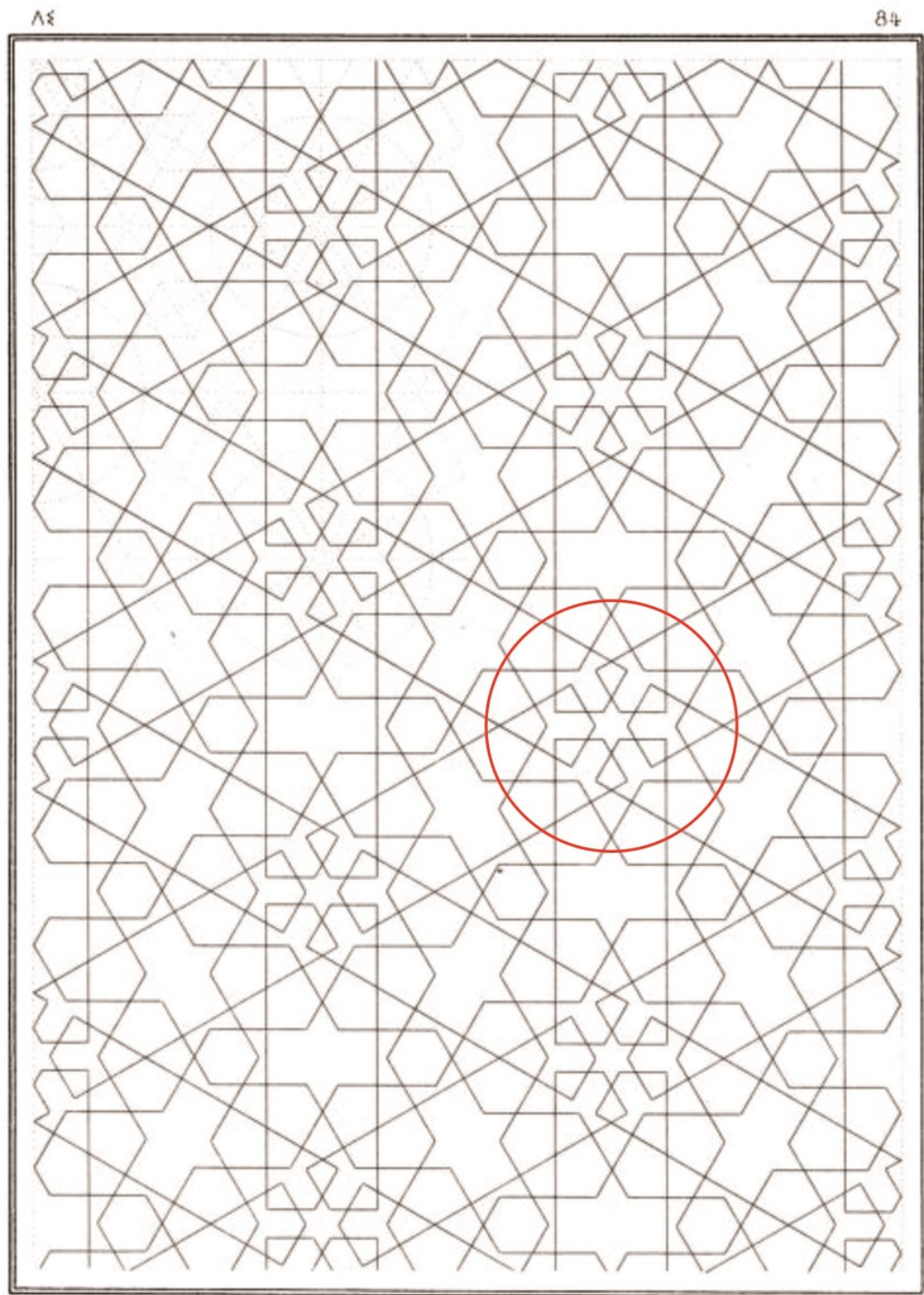


Figure 36. Geometric pattern of the dodecagons' family depicted by Jules Bourgoïn in *Les Éléments de l'Art Arabe*. The red circle encompasses the basic design of one of the most common patterns in lute rosettes.

The second most common design found in lute rosettes is the so-called 'Leonardo's knot' (Figure 37).<sup>164</sup> The denomination of this pattern probably originates from its vague resemblance to one of the series of six 'knots' thought to be designed by Leonardo da Vinci c. 1490, and later reproduced by Albrecht Dürer in 1507 (Figure 38). A similar pattern can be found in the fresco of intertwined vines and ribbons covering the vault of the *Sala delle Asse* in the Castello Sforzesco in Milan, painted in 1498. However, none of these patterns matches even partially the design of this rosette.

Both the 'Star' and the 'Da Vinci's knot' patterns can be described as what Bourgoïn calls *Entrelacs* (Interlacing) which he defines as:

The intricate interlacing and the embroidering of the surfaces, they are lines or flat patterns which the trace immediately translates into geometrical purifications.

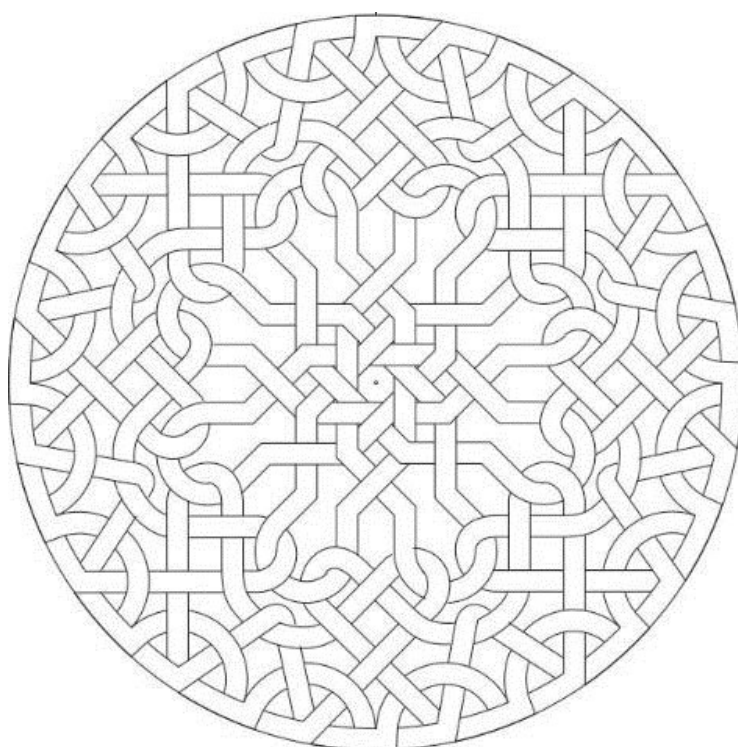
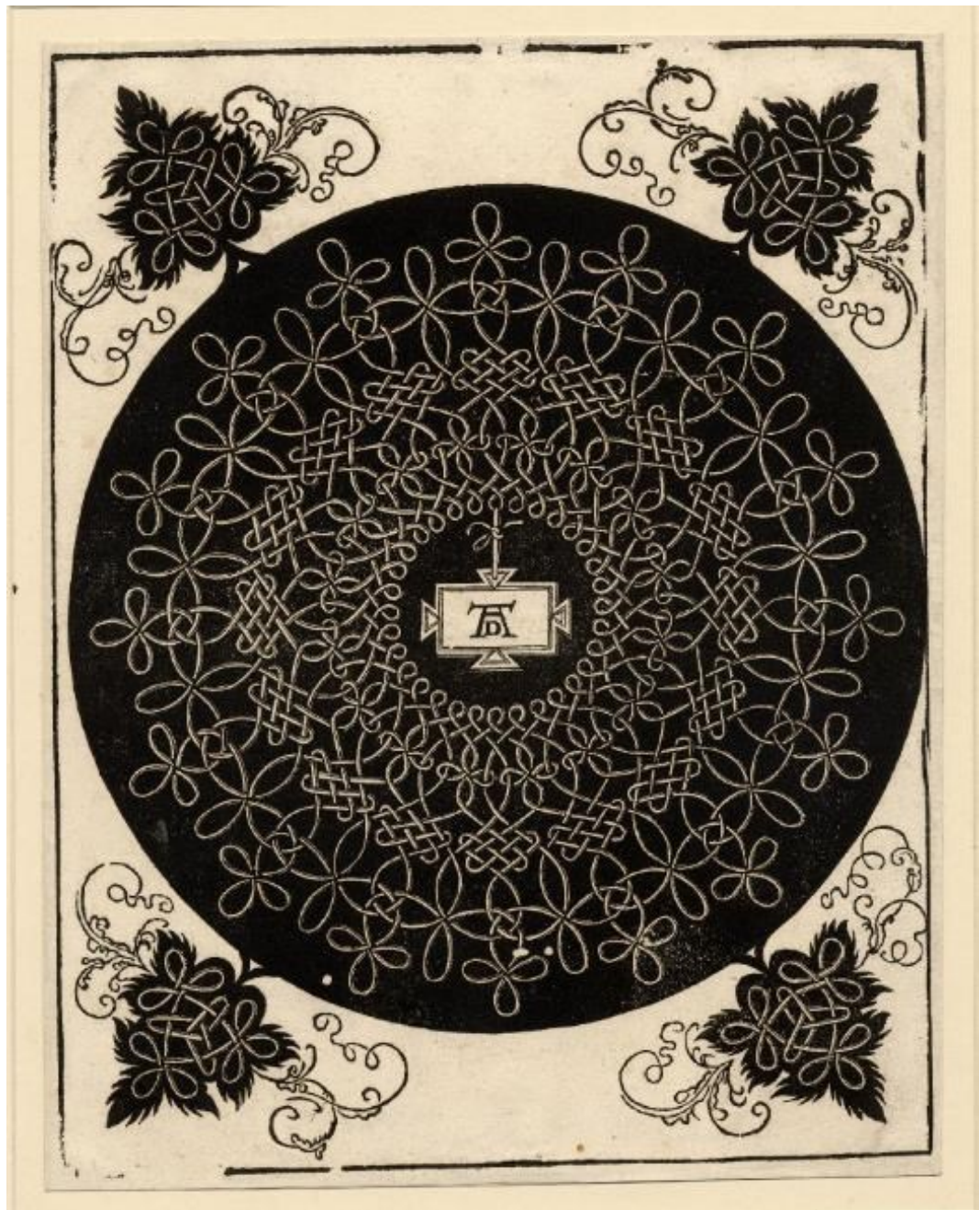


Figure 37. Pattern of the so-called Da Vinci's knot rosette.

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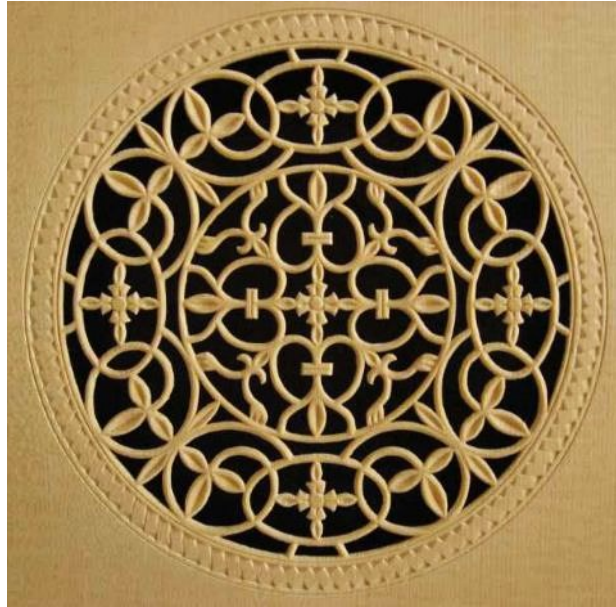
<sup>164</sup> See Figure 84 and Figure 114.





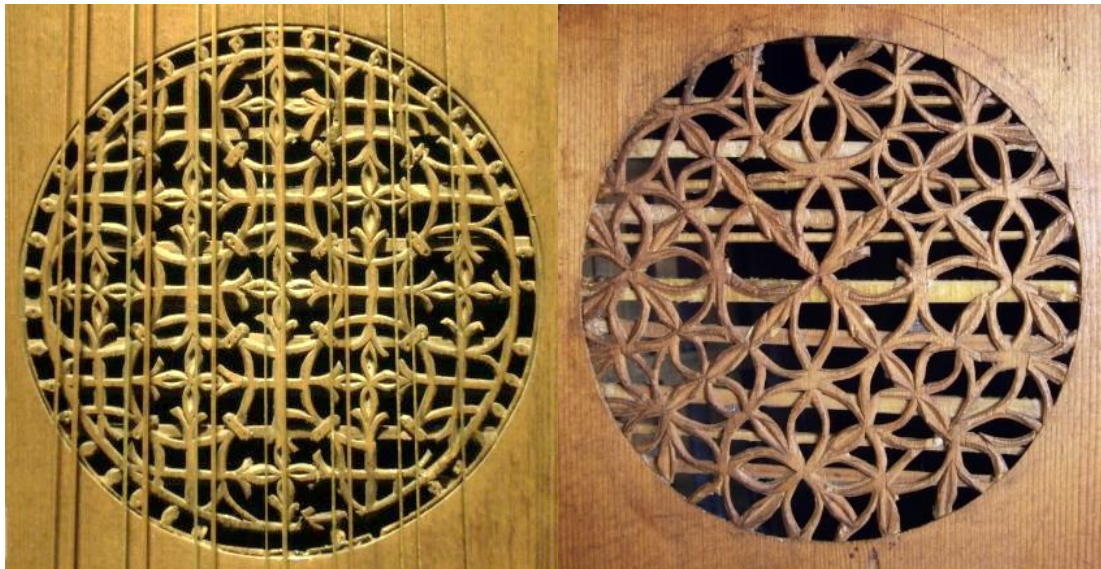
*Figure 38. Late impression of a copy of one of six decorative patterns of a knot. Print made by Albrecht Dürer after Leonardo da Vinci, c.1507, Woodcut. The British Museum (E,3.201).*

Other patterns commonly found in original rosettes of lutes of this period are geometrical figures with floral or foliate strap work (*Figure 39*); these are normally quite basic symmetrical designs, yet they are refined and aesthetically pleasing.



*Figure 39. Rosette with foliate pattern.*

A fourth group of rosette patterns are those formed by symmetric configurations of circles, sometimes combined with foliate decorative elements (*Figure 40*). This kind of pattern is less common in lutes from the sixteenth century, and becomes somewhat more prevalent in the subsequent centuries.



*Figure 40. Rosettes featuring a pattern formed by circles and foliate elements. Lute by Max Unverdorben, Museu de la musica (no.408), Barcelona (left), and lute by Pietro Railich 1669, Metropolitan Museum of Art (MMA2008.3a), New York (right).*

### Lute sizes and their tuning

Similarly to other instruments of the Renaissance period, lutes were conceived as a 'family' of instruments intended to be played in ensembles of instruments playing the different voices. Therefore, lutes were constructed in a variety of sizes meant to be tuned in different nominal pitches (strung with the same intervals between courses but at different heights of the scale). Praetorius in the second volume of his *Syntagma musicum*<sup>165</sup> describes seven sizes of lute from the smallest to the largest, and provides the note for their first string as follows:

Lute size	English translation	1 <sup>st</sup> string Tuning
<i>Kleinen Octavlaut</i>	Small octave lute	<i>c''</i> or <i>d''</i>
<i>Klein Discantlaut</i>	Small descant lute	<i>b'</i>
<i>Discantlaut</i>	Descant lute	<i>a'</i>
<i>Recht Chorist oder Altlaute</i>	Ordinary chorist or alto lute	<i>g'</i>
<i>Tenorlaute</i>	Tenor lute	<i>e'</i>
<i>Bassgenant</i>	Bass lute	<i>d'</i>
<i>Gross Octav Basslaute</i>	Octave great bass lute	<i>G</i>

Fifty years earlier, the lutes recorded in the Fugger inventory are often described by their size, either recorded as groups of different sizes or as individual instruments.

The detailed posthumous inventory taken of the contents of Laux Maler's workshop in 1552 enlists over a thousand finished lutes described in a variety of sizes. According to Stephen Barber and Sandy Harris "no less than 356 are described as 'small', 15 of 'medium' size and 635 as 'large'".<sup>166</sup>

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<sup>165</sup> Michael Praetorius, *Syntagma Musicum II De Organographia*, (Wolfenbüttel, 1619), 51.

<sup>166</sup> <http://www.lutesandguitars.co.uk/htm/cat01.htm> consulted on 27/12/2016.



The *Inventarium instrumentorum musicorum*<sup>167</sup> of the Stuttgarter Hofekapelle of 1589 also provides descriptions of lutes of different size, including a *grosse bass*, a bass lute, a descant lute, and two middle lutes.

The sizes and tunings provided by Praetorius have been interpreted to approximate string lengths in centimetres by a number of specialists, however there are some discrepancies in their results:

Lute size	String length in cm According to:		
	Rizzi <sup>168</sup>	Smith <sup>169</sup>	Prior <sup>170</sup>
Small octave lute	38 – 46	app. 41	not provided
Small descant lute	46 – 52	app. 44	c. 44
Descant lute	52 – 58	app. 50	c. 53
Ordinary chorist or alto lute	58 – 65	app. 58	c. 59 - 67
Tenor lute	65 – 77	app. 65	c. 70 - 71
Bass lute	77 – 86	app. 78	c. 78
Small octave lute	86 – 98	app. 94	not provided

The majority of extant lutes of the studied period appertain to either the alto or tenor lute groups. However, even within the same size range, their string length varies widely from 58cm to 66cm, to the point that to determine if a lute is an alto or a tenor instrument is often a matter of speculation. This difference of string length suggests that although these are all alto lutes, they were most likely tuned differently.

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<sup>167</sup> *Inventarium instrumentorum musicorum. 1589 angelegt, mit Nachträgen bis 1594.* Landesarchiv Baden-Württemberg. Hauptstaatsarchiv Stuttgart.

<sup>168</sup> Rizzi, *Liuteria* no. 14, 43.

<sup>169</sup> Smith, 79.

<sup>170</sup> Malcolm Prior's website: <http://malcolmprior.co.uk/Questions-of-size-and-pitch> consulted on 23/01/2017.

### Chapter 3: Renaissance in Augsburg and the guild structure

During the second half of the fifteenth and early sixteenth centuries, the Imperial city of Augsburg was at the cusp of a golden period as one of the largest and most prosperous early modern independent cities within the Holy Roman Empire.<sup>171</sup> The city is situated adjacent to the Lech River, a major tributary of the Danube River and one of the principal trade routes connecting Venice to northern Europe.<sup>172</sup> It was an established centre of international finance and trade, as well as a hub of culture and ideas. Augsburg's population was nearly 30,000 in 1500, achieving its highest population of 40,000 in 1618.<sup>173</sup>

In the early decades of the sixteenth century the city underwent significant economic, social, cultural, and religious change. Augsburg was at the intellectual centre of the Holy Roman Empire, where book production formed the backbone of intellectual development, second only to Wittenberg in the printing of Luther's works.<sup>174</sup> It was also an important artistic centre, home to renowned painters and woodcut engravers like Hans Holbein the Elder, Jörg Breu, Hans Burgkmair, and Leonhard Beck. This flourishing cultural environment was in part due to strong economic stability created by the some of the most powerful merchant families of Renaissance Europe who were residents of the Imperial city,<sup>175</sup> but also due to its privileged location on the Via Claudia Augusta.

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<sup>171</sup> Tlusty, B. *Ann. Augsburg during the Reformation Era: An Anthology of Sources* (Indianapolis: Hackett Pub. Co, 2012), xviii.

<sup>172</sup> Ellis Lee Knox, "The guilds of early modern Augsburg: a study in urban institutions." (1984). *Doctoral Dissertations 1896 – February 2014*. Paper 1136, 40.

<sup>173</sup> Plummer, M. "Augsburg." *Europe, 1450 to 1789: Encyclopaedia of the Early Modern World*. 2004. Encyclopedia.com. (October 24, 2015).  
<http://www.encyclopedia.com/doc/1G2-3404900072.html>

<sup>174</sup> Ibid.

<sup>175</sup> Namely the Fuggers, Baumgartners, Herwarts, Höchstetters, and Welsers



The Via Claudia Augusta was an early Roman road that led from the Po River lowlands and the Adriatic Sea, all the way to Bavaria and the Danube. It linked Venice with Augsburg, providing the fastest and most effective route to bring merchandise and travellers across the Alps, making Augsburg a place for transshipment and distribution of goods throughout Europe.<sup>176</sup>

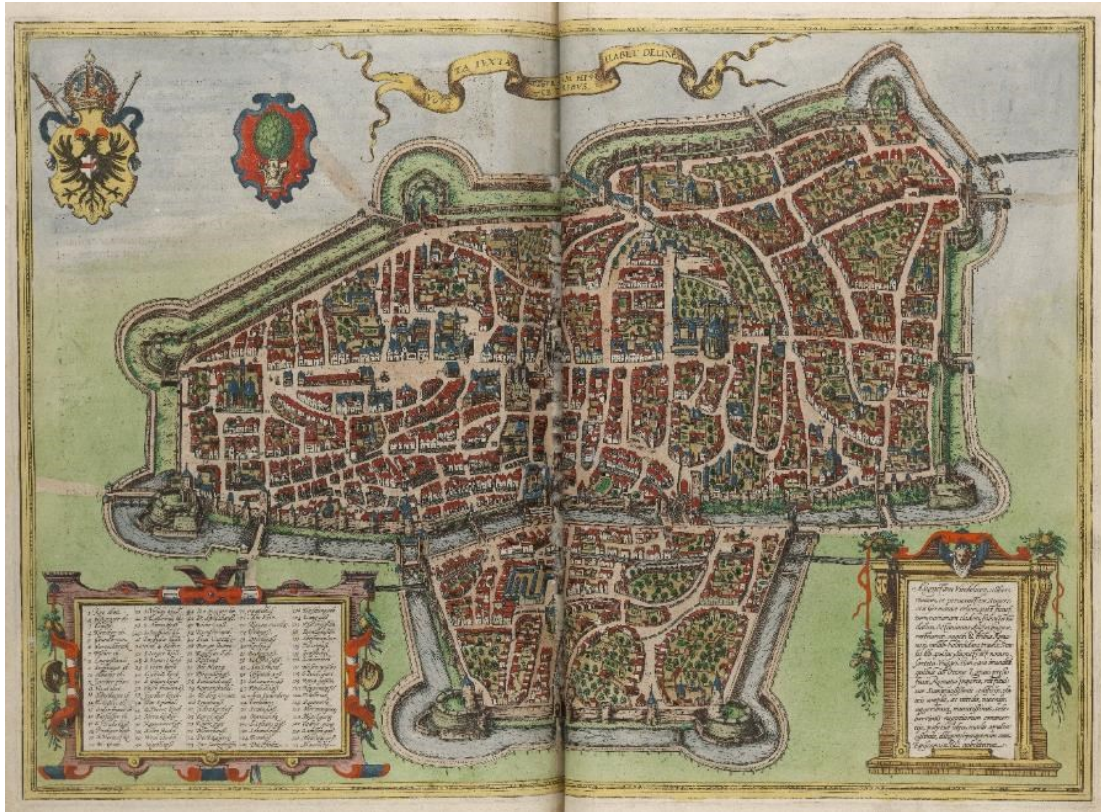


Figure 41. Birdseye view of the City of Augsburg ca. 1572. Georg Braun, Georg Höfnagel, and Franz Hogenberg. *Civitates orbis terrarum* vol.5 "Urbium Praecipuarum Mundi Theatrum Quintum". (Cologne, 1598): 39.<sup>177</sup>

A close financial relationship between the Fuggers and the Habsburg emperors of the Holy Roman Empire, particularly Maximilian I and Charles V, contributed to Augsburg's increasing importance in imperial economics and

<sup>176</sup> Martin Kluger. *The Fugger Dynasty in Augsburg: Merchants, Mining Entrepreneurs, Bankers and Benefactors*. (Augsburg, 2014), 11.

<sup>177</sup> The first edition of the *Civitates orbis terrarum* was published in 1572, additional maps were included in subsequent editions. Its engravings are dated between 1567 and 1597. The last edition was published in 1618.

politics. Evidence of this is the fact that twelve of the thirty-five Imperial Diets<sup>178</sup> held between 1500 and 1600 took place in Augsburg, including the Augsburg Confession (1530), the Augsburg Interim (1547–1548), and the Religious Peace of Augsburg (1555).

In 1368 a "guild revolution" or *Zunftrevolution* took place, a bloodless coup carried out by a circle of merchants and their followers, which resulted in a new constitution for Augsburg. This new guild-based government *Zunftverfassung*<sup>179</sup> gave certain guilds direct representation on the City Council, where they now held a majority over the patricians.<sup>180</sup> The existence of organized craft-guilds as a social and professional structure is first recorded around 1100<sup>181</sup> in Italy and the Holy Roman Empire, and rapidly spread throughout Europe in the following century. By the fourth century there were seventeen guilds or *Zünfte* in Augsburg<sup>182</sup>—they were of vital economic and political importance in the lives of Augsburg's inhabitants. Guilds were not only associations of craftsmen and merchants, but also political organizations with significant authority within the city government.<sup>183</sup> They regulated production and trade, but also social life and ethical conduct.<sup>184</sup> Guild membership was an essential prerequisite for citizenship, and because the guilds were institutions that represented the interests of the community, it was

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<sup>178</sup> Imperia Diet: from the Latin term: *Dieta Imperii* or *Comitium Imperiale*; in German: *Reichstag*. It was a general assembly of the Imperial Estates of the Holy Roman Empire. There was neither a fixed date nor specific location for the Diet to take place, until 1663 when the Perpetual Diet was implemented.

<sup>179</sup> In the German language, there are two words that can be translated to English as 'Guild': *Zunft* to describe an association of *Handwerksmeistern* (craftsmen), and *Gilde* to describe an association of *Kaufleuten* (Merchants).

<sup>180</sup> Knox, 44.

<sup>181</sup> Antony Black, *Guilds and Civil Society in European Political Thought from the Twelfth century to the Present* (London: Methuen & Co. Ltd, 1984), 6.

<sup>182</sup> P. Dirr, 'Studien zur Geschichte der Augsburger Zunftverfassung 1368 – 1548', *Zeitschrift des Historischen Vereins für Schwaben und Neuburg*, XXXIX, (1913), 144–243.

<sup>183</sup> Knox, 45.

<sup>184</sup> Dirr, 123.

through them that citizens were able to participate in the political life of the city.<sup>185</sup>

Many of the smaller guilds were not a part of the seventeen Zünfte, and others were amalgamated. For example, the carpenters' Zunft included masons and other building trades, plus the millers; the turners' Zunft also included waggoners and others who worked in wood; etc. The Zunft must be viewed as a political unit as much as an economic unit. Most craftsmen had little or no say in the decision-making process; indeed, many crafts were completely unrepresented in the council.<sup>186</sup>

Every year during the week before Christmas, the members of each of the seventeen guilds elected their guild master and the delegates to form the Small Council. This included one representative of each of the guilds,<sup>187</sup> the seventeen representatives from the previous year, and twelve representatives of the upper class gentry known as Patricians, who were not organized into the guilds but were also elected by the guild members. The Small Council effectively functioned as the legislative, juridical, and executive branches of government, as well as the Electoral College. Ten members of the Small Council were chosen to hold office: two city governors or *Bürgermeister*, one representative of the guild masters and one member of the patricians;<sup>188</sup> three *Einnehmer*, in charge

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<sup>185</sup> Joel Van Amberg, 'A Real Presence: Religious and Social Dynamics of the Eucharistic Conflicts in Early Modern Augsburg 1520-1530' *Studies in the History of Christian Traditions* (Brill 2011), 232.

<sup>186</sup> Knox, 46.

<sup>187</sup> According to Van Amberg, before 1476 there were two representatives from the six most influential guilds and one for each of the other eleven guilds.

<sup>188</sup> Ann B. Tlusty, *Augsburg during the Reformation era: an anthology of sources* (Indianapolis: Hackett Pub. Co. 2012): xxi.

of collecting resources; three *Baumeister*, who managed the expenses; and two *Siegler*, who controlled the city seal.<sup>189</sup>

In addition, each of the guilds elected twelve representatives known as *Zwölfer* who, together with seventeen guild masters and the twelve patricians of the Small Council, made up the Large Council.<sup>190</sup> The duties of the Large Council were limited to major events and matters of significant importance for the city – like reforms, and state legislations – or it was convened for ceremonial occasions.

Whilst in many ways merchant guilds were similar to chambers of commerce, focusing on maximizing the volume of trade and the resulting benefits, craft guilds resembled labour unions.<sup>191</sup> They were formed as social organisations with the intention of ensuring the livelihood of their members. This was achieved by regulating quality standards of workmanship, maintaining a controlled number of operating workshops or commercial enterprises within the city to safeguard a fair volume of business for their members, and by securing the continuation of the craft by a regulated apprenticeship training system.<sup>192</sup> Strict guild statutes for the admission of new masters included a long and demanding apprenticeship followed by a period as journeymen before achieving eligibility to become masters, and trade with outsiders was rigorously controlled to prevent unfair prices and ensure quality standards.

This structure resulted in a demarcated socio-economic stratification. Guildsmen were regarded as a privileged group and any guild master –

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<sup>189</sup> Amberg: 233.

<sup>190</sup> A total of 233 members.

<sup>191</sup> Randall Fegley. *The Golden Spurs of Kortrijk: How the Knights of France Fell to the Foot Soldiers of Flanders in 1302*, (Jefferson, McFarland, 2002): 18.

<sup>192</sup> Black: 8 - 9.

regardless of his affluence—was a member of the community and therefore superior to the non-citizens.<sup>193</sup> In the mid-sixteenth century in Augsburg, “50-60 percent of householders and 12-13 percent of inhabitants were registered guild masters”.<sup>194</sup>

Once accepted by the guild, a master was allowed to offer his services to the public – always following the statutes of the guild as well as adhering to its strict standards – and to take on apprentices and journeymen. A master’s residence would typically consist of a retail space, a workshop, storage space, and living quarters, not only for him and his family, but for the apprentices and often also a journeyman. Apprentices were not allowed to marry, they were usually teenagers essentially adopted by the masters during their apprenticeship, which would last between two and seven years, depending on the guild. During this time they were provided with a room, board, and training, but no financial compensation. Indeed, there was a fee to be paid to the guild for taking on an apprentice which had to be covered either by his family or by the master.<sup>195</sup> Guild regulations admonished masters to teach their trade in an honest manner, abiding to guild principals, while apprentices and journeyman were expected to obey their master without reservation.<sup>196</sup>

Journeymen were workers non-affiliated to the guild but entitled to earnings; they would work for more than one master<sup>197</sup> and were expected to travel from town to town to perfect their craft by learning the trade from masters in

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<sup>193</sup> Broadhead, P. J. “Guildsmen, Religious Reform and the Search for the Common Good: The Role of the Guilds in the Early Reformation in Augsburg,” *The Historical Journal*, Vol. 39, No. 3 (September 1996): 577-597.

<sup>194</sup> Sheilagh Ogilvie. ‘The Economics of Guilds’. *The Journal of Economic Perspectives*, Vol. 28, No. 4 (American Economic Association: Fall 2014), 173.

<sup>195</sup> Tlusty, 136.

<sup>196</sup> Tlusty, 137.

<sup>197</sup> Not concurrently.

neighbouring towns, although often master's sons would learn the trade directly from their father.<sup>198</sup> To become a master, a journeyman had to complete a masterpiece with his own tools; the guild collegium would judge the craftsmanship of this masterpiece and vote for his admission to the guild. Once accepted to the guild, the new master had to pay a fee to the guild and subscribe to the strict regulations of craftsmanship and marketing imposed by it. As part of the benefits of belonging to the guild a master was allowed to marry and to establish an independent household.

Small groups of craftsman, like sculptors, painters, or lute makers were commonly not numerous enough to form a guild of their own with full rights and representation in the council. A common practice was for them to combine with other groups of similar crafts to create a larger section within one of the large guilds.<sup>199</sup>

There were five woodworking industries of significance in Augsburg: sawyers, carvers, turners, carpenters, and joiners or cabinet makers. Sawyers converted logs into wood planks in sawmills and stockpiled them in lumber yards. Carpenters did the basic wood construction work and rough basic furniture such as workbenches. Carvers made a wide variety of items from wooden utensils to decorative work. Turners worked on anything that required lathe-work. Cabinet makers fulfilled tasks requiring joining pieces of wood by means of a mortice and tenon joint. The other technique that belonged exclusively to the cabinet makers was the use of glue.<sup>200</sup> The limitations imposed to each of these groups often resulted in conflicts and quarrels that had to be solved by

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<sup>198</sup> Tlustý, 136.

<sup>199</sup> Michael Baxandall, *The Limewood Sculptors of Renaissance Germany* (New Haven and London: Yale University Press, 1980), 107.

<sup>200</sup> Knox, 86.

the city council. On the other hand the collaboration between masters of different guilds was not uncommon, i.e. a piece of furniture made by a master cabinet maker could be then worked by a master carver, and finished by a master goldsmith.

The first guild of lute makers was funded in Füssen in 1562, due to a substantial increase in the number of workshops active in a relatively short period. According to Rudolph Hopfner “There is evidence that in the mid-sixteenth century several lute makers from the surrounding villages and cities moved to Füssen. Within a couple of years the number of lute makers had increased from four to eighteen”.<sup>201</sup> The lute makers’ guild *Ordnung* or guild regulations are similar to those for the other guilds:

- Every apprenticeship must learn his trade for five full years.
- Every master who wishes to take a new apprentice must wait three years since his last apprentice has fulfilled his term of five years.
- Every accepted and employed apprentice shall immediately pay one gulden to the coffers of the guild.
- Five years of apprenticeship must be completed before working as a journeyman, and the first month’s earnings must be paid to the guild.
- No one shall be accepted as a master if he has not undergone three years as a journeyman in addition to the five years of apprenticeship, before he marries.
- To become a master, a journeyman must make a lute with all its accessories, with his own hands, as a masterpiece. The guild then decide

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<sup>201</sup> Rudolf Hopfner, *The Füssen school, part 1*, (June 15, 2016) <http://tarisio.com/cozio-archive/cozio-carteggio/fussen-part-1/> consulted on 28/12/2016.

whether the masterpiece is accepted or not. And he shall then deposit two gulden in the coffers of the guild.

- A new master is not to have an apprentice during his first three years as a master. The son of a master of the guild may be forgiven one of the above-mentioned three years.
- A new master, unless married, has to own household and tools to be permitted to practise his profession.
- The guild statutes end with the rule that prohibits any non-members of buying lute staves and to plane them and sell them or brand them independently. Anyone violating this would be put out of business by the guild and punished according to the judgment of the guild.<sup>202</sup>

There is no evidence of the existence of an equivalent guild in Augsburg, instead instrument makers were members of the guild of cabinet makers.<sup>203</sup>

The socio-political culture that developed from the guild constitution remained influential under the new government throughout the sixteenth and into the seventeenth century. The majority of the guildsmen of Augsburg seem to have been supporters of the Reformation. However, in 1547, the protestant Schmalkaldic League was defeated by the Emperor Charles V, marking the beginning of the Augsburg Interim (1547–1548). Charles V re-established the rights of Roman Catholics in Augsburg by dissolving the Zünfte and altering the city constitution to promote a leadership shared between the Catholic and Protestant patricians. The Zunft master and the committees were abolished, and each guild was placed under overseers appointed by the City Council.

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<sup>202</sup> Smith, 322-324.

<sup>203</sup> *Kistlerarbeiten* or *Kistlermacher*. The word *kistler* is an old German term for case or chest, therefore the guild of cabinet makers is also referred as the guild of chest makers.



The abolition of the *Zunft* government did not result in the dissolution of the guilds; in fact after 1550 there was a clear increase in the number of smaller guilds within the city of Augsburg; as crafts developed, guilds divided into more specialized guilds with less political power.<sup>204</sup>

After a brief period of shifting power, the Religious Peace of Augsburg (1555) established Augsburg as one of a few fully bi-confessional cities under the principle of *cuius regio, eius religio* (whose realm, his religion).<sup>205</sup> This peace was not to last, and in 1582 the conflict known as the *Kalenderstreit*, 'calendar struggle', over the imperial mandate for the installation of the Gregorian calendar resulted in new religious strife. Leonhard Rauwolf<sup>206</sup> was one of the leaders of the Protestant opposition.<sup>207</sup> Notwithstanding the efforts from both conflicting groups to reach a peaceful solution, the majority of Catholic representatives in the city council were strong enough to win over the Protestants and in 1584 the Gregorian calendar was definitively introduced.

In the late sixteenth and early seventeenth centuries, the city council maintained an apparently neutral policy with regard to the religious preferences of their population. Nonetheless, from 1588 numerous Catholic priests were restored, and upon the reluctance of the Protestant burghers to accept their authority, influential Lutheran city employees were forced to either support the newly appointed priests or to leave their official appointments and functions. An example of this is Leonhard Rauwolf who in March of 1588 received his last salary as the "official doctor" of the city.<sup>208</sup>

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<sup>204</sup> Fegley, 18.

<sup>205</sup> Tlustý, 289.

<sup>206</sup> Sixtus' uncle.

<sup>207</sup> Dannenfeldt, 231.

<sup>208</sup> Ibid.

During the mid-seventeenth century, Augsburg suffered a political and economic downturn. The population decreased to a low of 16,422 in 1635 as a result of the effects of plague epidemics and the Thirty Years' War.<sup>209</sup> By the late seventeenth and eighteenth centuries the Augsburg economy recovered, mainly due to the exports of silver, the establishment of textile manufacturing, and the city's continuing role in international banking and finance.

### **Lute making in Augsburg**

The first lute makers in Augsburg can be traced to the fifteenth century; archival sources place the first registered lute maker in 1442 under the name *Rudolf* and after that, Hans Meisinger (1447), Peter Lamenit (1460-1484), Kranuck (1477), Hans Sälcher (1483), George N. who also appears as Jörg (1496) and the lute and dulcimer maker Brathel Schuster (1499-1516).<sup>210</sup> There are a small number of lute makers contemporaneous to Sixtus Rauwolf registered in the archives of Augsburg: the aforementioned Weiland Sturm; Rudolf Bossart, who appears in the tax books of 1615, 1619, and 1625;<sup>211</sup> Jacob Bossart, who is recorded without specifying his profession in 1625 (according to John Dilworth, Jacob Worked circa 1625-1640 in Augsburg and was probably the son of Rudolf);<sup>212</sup> and Josef Faber, who apparently sold an unspecified instrument 1588 in Tübingen.<sup>213</sup>

Unfortunately no extant instruments of any of these makers exist today. The only known lutes from Augsburg built during the studied period are those made by Sixtus Rauwolf, and therefore it is impossible to establish the regional

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<sup>209</sup> Plummer: <http://www.encyclopedia.com/topic/Augsburg.aspx> consulted on 20/07/2016.

<sup>210</sup> Adolf Layer, "Die Anfänge Der Lautenbaukunst in Schwaben." *Die Musikforschung* 9, no. 2 (1956), 191.

<sup>211</sup> Willibald Leo Lütgendorff, *Die Geigen Und Lautenmacher Vom Mittelalter Bis Zur Gegenwart*, third edition. (Frankfurt & Main: Frankfurter Verlags-Anstalt A. G., 1922), 53.

<sup>212</sup> John Dilworth, <http://www.amati.com/maker/bosshart-jacob/> consulted on 30/07/2016.

<sup>213</sup> Lütgendorff, 127.

characteristics of lute making or to talk about an Augsburg school of lute making.

Just 100 kilometres from Augsburg, in the valley of the Leech River, lies the small town of Füssen, which has often been called the cradle of lute making in Europe of the sixteenth century.<sup>214</sup> Between Füssen and Augsburg there are a number of small villages like Shongau, Roßhaupten, Tieffenbruck, and Immenthal, which also held a strong tradition of lute making, and seem to be related through family ties as well as via the exchange of journeymen and apprenticeships. A good example of this is the renowned lute maker Laux Boss; originally from Schongau, he was the son of a Füssener. He was active in Augsburg before and after the Reichstag of 1559, where in particular the Fugger were among his clientele, whilst also supplying the Ducal Court in Munich with instruments. According to Adolf Layer, one of Boss' employees might have been Paul Sturm from Augsburg, who spent some time in Schongau, and upon his return to his hometown might have been the employer of Sixtus Rauwolf.<sup>215</sup>

The motives behind this cluster of lute making centres in this particular area are not clear. Arguments can be made with regard to the availability of materials, its location at the foot of the Alps at the end of the Via Claudia Augusta, or the influence of rich families like the Fugger, who were patrons of the arts and some of them known lute players and collectors. What is certain is that most active lute makers in Europe during the Renaissance came from this

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<sup>214</sup> Willibald Leo Lütgendorff, *Die Geigen- und Lautenmacher vom Mittelalter bis zur Gegenwart* (Frankfurt, 1904).

Jonathan Santa Maria Bouquet, "The Lute." In *Heilbrunn Timeline of Art History*. New York: The Metropolitan Museum of Art, 2000–.

[http://www.metmuseum.org/toah/hd/lute/hd\\_lute.htm](http://www.metmuseum.org/toah/hd/lute/hd_lute.htm) (April 2010)

<sup>215</sup> Adolf Layer, *Die Allgauer Lauten- und Geigenmacher ein Kapitel schwäbischer Kultureistung für Europa*, (Augsburg, 1978), 33-34.

region,<sup>216</sup> some of them migrating to important trade and commerce cities like Venice or Lyon, or to cultural centres like Padua and Bologna. This migration has been attributed to the strict regulations of the guild of lute makers of Füssen. Although this might have had an impact in the number of lute making workshops in Füssen, the guild ordinances were only passed in 1562, and a significant number of renowned German luthiers like Laux Maler, Hans Frei, and Magno Duiffopruggar (Tieffenbrucker) were active in Italy much earlier. According to Smith:

The German tradition of making lutes in Italy appears to have been well established by about 1500.<sup>217</sup>



Figure 42. Antique town view of Lech, Füssen, Allgäu, Bavaria. Matthäus Merian the Elder, engraving, Frankfurt circa 1643.

After Rauwolf's death there were a number of known lute makers in Augsburg, of whom some instruments are still extant, among them Thomas Edlinger, Hans Georg Edlinger, Georg Aman, Philipp Jacob and Mathias Fichtl, and Gregori Ferdinand Wenger. It is hard to say if Rauwolf's work influenced the work of any of these makers directly.

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<sup>216</sup> Smith, 63.

<sup>217</sup> Smith, 64.



## Chapter 4: Sixtus Rauwolf and his work

Sixtus Rauwolf was a German lute maker active in Augsburg from the second half of the sixteenth to the beginning of the seventeenth centuries. The spelling of this surname varies, appearing in documents and instrument labels as Rauchwolff, Rauchwolf, or Rauwolf. The genealogy of the Rauwolf family is unclear due to the rather limited archival evidence, but thanks to tax records and court documents it can be established that they were a Protestant, middle class family with access to education and of certain social status.<sup>218</sup>

Details of Sixtus' life are scant; his birth and death certificates are no longer in existence. His birthdate is often set as 1556 based on an archival census of 1619 in which he appears enlisted as sixty-three years old.<sup>219</sup> However, there are two additional archival censuses that contradict this: one dated 1610 in which his recorded age is fifty,<sup>220</sup> and another from 1615 in which he is sixty-five years old.<sup>221</sup> These contradictory records are not uncommon in this period, according to Ellis Lee Knox:

The information reported to the census takers was not consistent, particularly in the category of age. The difference in age from the 1610 to the 1615 Muster List was not always five years. Sometimes it was eight or two. Some individuals miraculously grew younger. The inconsistencies appear to have been random.<sup>222</sup>

Therefore these censuses can be interpreted in more than one way; on one hand only one of them is right and Sixtus was born either in 1550, 1556, or 1560; a more plausible scenario would be to assume there is an error in the 1615 document and that it was meant to say fifty-five rather than sixty-five years

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<sup>218</sup> Simone Herde, Walter Tilmann. "Neues Zur Biographie Des Augsburger Arztes Und Orientreisenden Leonhard Rauwolf (1535?-1596)." *Sudhoffs Archiv* 94, no. 2 (2010): 155.

<sup>219</sup> StadtAA, Selekt Schätze, Nr. 37/III Beschreibung der Bürgerschaft 1619.

<sup>220</sup> StadtAA, Selekt Schätze, Nr. 37/II Beschreibung der Bürgerschaft 1610.

<sup>221</sup> StadtAA, Gassenhauptleute, Musterungsregister 1615: S. 346.

<sup>222</sup> Knox, 34.

old, in which case both documents (1610 and 1615) confirm that he was born in 1560. Unfortunately none of the above can be confirmed at the present time and therefore Rauwolf's birth year remains unknown.

He was probably the grandson of Sixt Rauwolf the Elder (*d* 1557) who was an iron trader<sup>223</sup> and member of the Grand Council of the imperial city of Augsburg since 1549, and his wife Agatha Eggelhof (*d* 1583). Together they had seven sons: Leonhard, Hans (or Johann), Georg, Sixt the Younger, Matthäus, Ulrich, and a daughter, Agatha.<sup>224</sup>

Evidence of the social status of the Rauwolfs is the family crest, granted on 24<sup>th</sup> May 1548 to Sixtus Senior by the Emperor Charles V,<sup>225</sup> depicted in Eduard Zimmermann's book of Heraldry of Augsburg (*Figure 43*).<sup>226</sup> It is described as "In a blue shield, a wolf with a white goose by the throat; the same crest growing from the frog-mouth helm with bead between a blue-white and white-blue split mantling".<sup>227</sup> In addition, three variations of the Rauwolf monogram also appear in Zimmermann's book (*Figure 82*),<sup>228</sup> one of them very similar to that used by Sixtus to brand his instruments. Unfortunately the text accompanying the

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<sup>223</sup> His profession appears in archival sources listed as *Eisenkramer*. The word *Kramer* designates a profession and means small retailer and *eisen* means iron, therefore an "Eisenkramer" used to trade iron. Nowadays this word is no longer in use to name a profession, but it remained a surname.

<sup>224</sup> Herde, Tilmann: 155.

<sup>225</sup> Karl Friedrich von Frank: *Standeserhebungen und Gnadenakte für das Deutsche Reich [i.e. für das Heilige Römische Reich] und die Österreichischen Erblande bis 1806, sowie kaiserlich Österreichische bis 1823, mit einigen Nachträgen zum "Alt-Österreichischen Adels-Lexikon"* Vol. 4, (Schloss Senftenegg, 1973): 145.

<sup>226</sup> Eduard Zimmermann. *Augsburger Zeichen und Wappen : (Bildband) : umfassend die Bürger der Reichsstadt Augsburg und die Inhaber höherer geistlicher Würden der Bischofsstadt Augsburg, ihrer Stifte und Klöster*. (H. Mühlberger: Augsburg, 1970). Tafel 157.

<sup>227</sup> (*In Blau ein naturfarbener Wolf mit einer weißen Gans im Rachen; derselbe wachsend auf dem Stechhelm mit Wulst zwischen zwei blau-weiß und weiß-blau geteilten Flügeln*). Crest's description by Eduard Zimmermann: *Augsburger Zeichen und Wappen*, Typewritten manuscript o. O. o. J. undated [before 1970]: 887. Quoted in Herde & Tilmann: 132.

<sup>228</sup> Zimmermann. *Zeichen* 916.

description of the monograms was never published. According to Friedrich Blendinger in the Foreword for Zimmermann's book, due to war restrictions the paper required for the publication in full was not granted and whilst the picture immediately went into print, the necessary revision of the text could not be completed.



Figure 43. Rauwolf family crest.<sup>229</sup>

It has been previously suggested that Sixtus was the son of the famous botanist and traveller Leonhard Rauwolf.<sup>230</sup> This theory is rather unlikely since there is an entry in the Augsburg tax books of 1566 recording the deduction of two gold florins on Agatha Rauwolf's (widow of Sixt Rauwolf) capital, for the marriage of her son "Doctor Lienhart Rauchwolff".<sup>231</sup> It is implausible that Leonhard

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<sup>229</sup> Zimmermann, Tafel 157.

<sup>230</sup> Michael Lowe, Stephen Gottlieb, and David Munro "Restoring an original Sixtus Rauwolf lute" *Lute News* No. 83 (London: October 2007).

<sup>231</sup> Stadtarchiv Augsburg. *Steuerbuch* 1566 (fol.46).



would have fathered Sixtus at least six years before his marriage. Also, around the time Sixtus was born, Leonhard was otherwise engaged; in November of 1556, Leonhard Rauwolf enrolled in the Lutheran University of Wittenberg,<sup>232</sup> from 1560 to 1562 he continued his studies at the University of Montpellier in France, and then he moved to the University of Valencia to receive the title of Doctor of Medicine.

An archival document confirms that Sixtus was indeed the son of Sixt the younger (brother of Leonhard) and Maria Mayrin.<sup>233</sup> According to Herde and Tilmann, Sixt the younger is also known as Georg Sixt and is perhaps the same as the Georg Rauwolf<sup>234</sup> who was also a representative of the Manlich Firm in Tripoli and died in Cyprus in 1573.<sup>235</sup>

On January 7th 1577 Sixtus (the lute maker) obtained permission to marry Margareth Schlaurin, widow of the lute maker Paul Sturm.<sup>236</sup> This document (*Figure 44*) reads:

Six Rauwolf and Margareth Schlaurin, widow of lute maker Weiland Sturm, may he rest in peace, both citizens; witness for the bridegroom Ulrich Rauwolf, tradesman, and for the bride Jeremias Sturm, cabinet maker.<sup>237</sup>

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<sup>232</sup> C. E. Foerstemann, *Album Academiae vitebergensis ab a Ch. MDII usque ad a. MDLX*. 3 vols. (Liepzig and Halle, 1841 – 1905): 324.

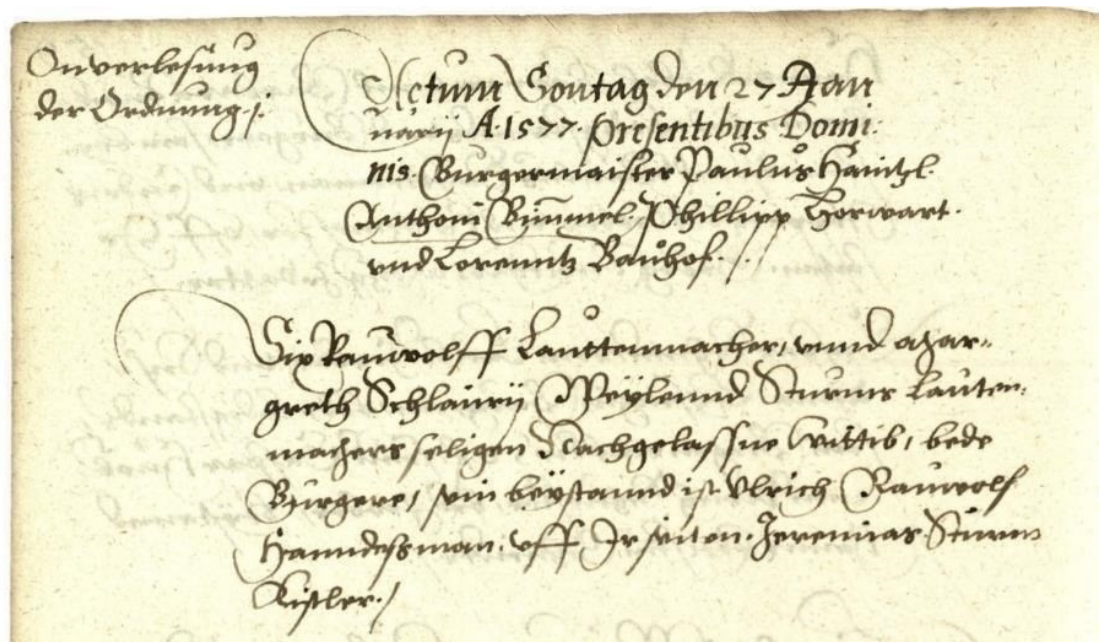
<sup>233</sup> Stadtarchiv Augsburg (StadtAA), Oberpflegamt, Pflugschaftsbuch Nr. 14 (weitere Serie, 1582-1593), 414.

<sup>234</sup> Herde, Tilmann: 132.

<sup>235</sup> Dannenfeldt: 40.

<sup>236</sup> StadtAA, Hochzeitsamt Protokolle Nr.III.

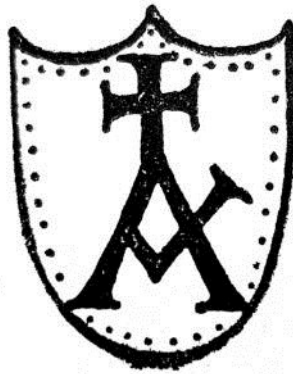
<sup>237</sup> Also quoted in: Lütgendorff, Willibald Leo *Die Geigen- und Lautenmacher vom Mittelalter bis zur Gegenwart* (Frankfurt, 1904): 519.



This might suggest Rauwolf was working for Weiland Sturm as a journeyman, since Guild regulations of the time encouraged unions between members of families of the same trade. Sturm was born in Augsburg, but he moved to Schongau where he is listed in the tax registers of 1549. A few years later, in 1568, his name is recorded in a Füssen monastery archive, and later he returns to Augsburg. In 1573, he appears in the Augsburg tax registers as a lute maker and in 1576 he is recorded as deceased.<sup>238</sup> In Zimmermann's heraldry book, there is a registered monogram of the Sturm family (*Figure 45*),<sup>239</sup> unfortunately to this date there are no known extant instruments by Sturm.

<sup>238</sup> Richard Bletschacher, *Die Lauten und Geigenmacher des Fussen Landes* F. Hofmeister, 1978: 208.

<sup>239</sup> Zimmerman: Wappen 341.



Sturm

Figure 45. Monogram of the Sturm family. Zimmermann 341.

Sixt Rauwolf appears in the *Pflegschaftsbuch*<sup>240</sup> (book of registers) from 1577 to 1582<sup>241</sup> and also in the *Steuermeisteramt, Steuerbücher* (Augsburg tax registers) from 1582 to 1629.<sup>242</sup> From these tax registers we can establish that from 1582 until 1590 he was a resident of the *Stephinger oder Barfüßertor*, "gate of the 'bare-foot' monks" area, which formed the connection between two suburbs.<sup>243</sup> After 1590 he appears as resident of *Heilig Kreuzer Tors* "the gate of the Holy Cross" (Figure 46).

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<sup>240</sup> There is no direct translation for *Pflegschaftsbuch*. In the context of the sixteenth century it refers to a book in which are recorded all matters of guardianship (*Pflegschaften*), in particular the management of public funds.

<sup>241</sup> StadtAA, *Pflegamt Kl. Pflegschaftsbuch*, 1577-1582.

<sup>242</sup> StadtAA, *Steueramt Steuerbuch*, 1582 (8 a), 1583 (8 d), 1590 (42 d), 1597 (46 c), 1604 (44 d), 1611 (46 b) 1618 (44 b), 1625 (43 b), 1626 (42 d), 1627 (42 b), 1628 (43 a), 1629 (44 cc).

<sup>243</sup> Guy Oldham, Sixt Rauwolf, Lute Maker in *The Galpin Society Journal*, n. XIII, 1968 Notes and Queries: 88-89.

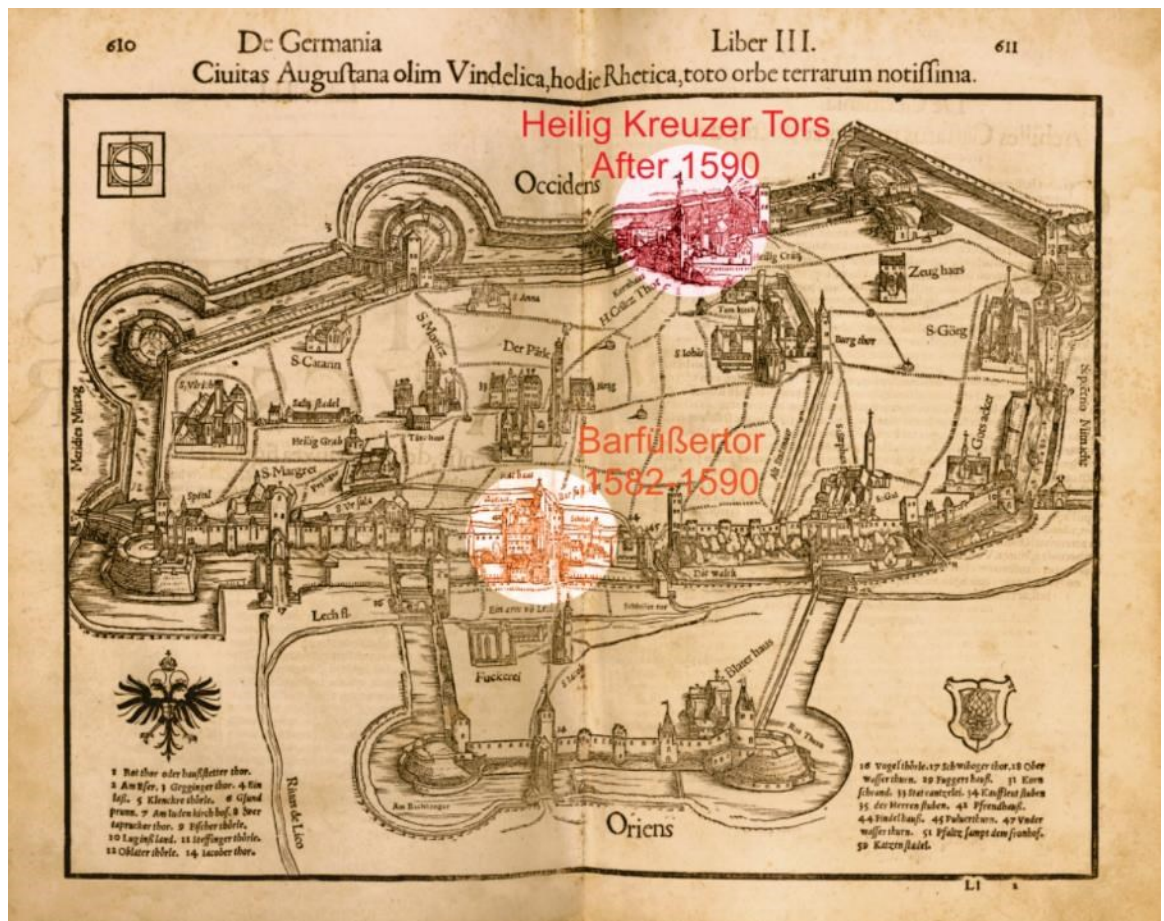


Figure 46. Sixtus Rauwolf's workshops.<sup>244</sup>

An archival document from 1584<sup>245</sup> unveils further family ties of Sixtus. It records that Sixt Rauwolf established two advising counsellors for himself and his two siblings, Sebastian and Hans, due to a "contentious testament". His advisers were Cristoff Mitter (tailor) and Jeremiah Sturm (cabinetmaker). This is the only document that references Sixtus' siblings, suggesting at the same time a close relationship with Jeremiah Sturm, who was related to Sixtus' wife Margareth Schlaurin through her previous marriage and who was also her wedding witness.

<sup>244</sup> Map of Augsburg from the and early Latin edition of Munster's *Cosmography* published in 1544.

<sup>245</sup> StadtAA, Oberpflegamt, *Pflegschaftsbuch* Nr. 14 (1582-1593).

Additional entries in archival records mentioning Sixtus include his appearance as a witness for his uncle Ulrich.<sup>246</sup> Ulrich was a Council member representative of the merchant guild, and in 1590 he was accused of irregularities in conducting Council finances which resulted in embezzlement. From this entry it appears that Ulrich Rauwolf bought fish from certain merchants on behalf of the Council (possibly for urban celebrations, guest hospitality etc.) and created spending notes in a separate book (referred in the entry as *Fischbuches* or 'fish book'), resulting in the alleged misappropriation of city treasury money.<sup>247</sup>

There is a very interesting fascicle dated 1625<sup>248</sup> in which Sixtus Rauwolf, together with the lute makers Rudolf and Jakob Bossart, started a legal dispute that lasted several months against Baltasar Schuster, for establishing a shop as a lute maker without the proper guild qualifications. Schuester was originally from Unterthürheim near Wertingen, and had married the widow of the lute maker Hans Linder in 1617 in Augsburg. In his appeal he declared he had been taught instrument making hand-skills by a Dutch master. He also claimed to be operating legally, arguing that lute making should be regarded as "*freie Künste*" (liberal arts) which could be carried out without being a member of a craft's guild. Therefore, from his viewpoint every cabinet maker has the right to build and sell musical instruments, although no lute maker is authorized to undertake cabinet maker's work.<sup>249</sup>

The lack of a death certificate makes it impossible to determine the precise date on which Sixtus Rauwolf died; however, in the tax register from 1629 he

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<sup>246</sup> The same Ulrich Rauwolf who signed as a witness in Sixtus' wedding.

<sup>247</sup> StadtAA, Rst., Strafamt, Urgichten, 1590d XII 17, 28.

<sup>248</sup> StadtAA, Stadtpfleger, Geheimer Rat und Rat – Handwerkerakten, Kistler, Karton 183, Fasz. 5.

<sup>249</sup> Layer (1978), 34.





## Rauwolf's work

Only six extant instruments made by Sixtus Rauwolf are known at the present time, four held in public collections and two belonging to private owners. The following list indicates the year they were made, the place in which they are currently held, as well as the accession number where available:

- 1577<sup>251</sup> Fuggermuseum im Schloss, Babenhausen, Germany
- 1593 Private collection of Guy Oldham, London, United Kingdom
- 1596 Metropolitan Museum of Art, New York, United States, MMA 89.2.157
- 1598 Musikmuseet (Danish Music Museum), Copenhagen, Denmark, CL 93
- 1612 Scenkonstmuseet (Swedish Museum of Performing Arts), Stockholm, Sweden, MM 1788
- Undated<sup>252</sup> Private collection of Jakob Lindberg,<sup>253</sup> London, United Kingdom

In addition to the extant instruments, there are archival resources with records of instruments by Rauwolf. The inventory of the *Stuttgarter Hofkapelle* (Stuttgart Court Orchestra) 1589 – 1594<sup>254</sup> includes one entry listing two instruments made by Rauwolf: one described as “a new lute, with 16 strings, with a bent

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<sup>251</sup> In all further references to each of Rauwolf's lutes only the date will be used to designate a specific instrument.

<sup>252</sup> No label by Rauwolf is present inside this instrument and therefore its date of construction cannot be determined.

<sup>253</sup> The names of the two private owners are published with their full knowledge and previous authorization.

<sup>254</sup> *Inventarium instrumentorum musicorum. 1589 angelegt, mit Nachträgen bis 1594.* Landesarchiv Baden-Württemberg. Hauptstaatsarchiv Stuttgart.



neck<sup>255</sup> and a bridge, and a case with a lock, made by Sixt Rauchwolffen";<sup>256</sup> and another one described as a "lute acquired from Sixt Rauchwolffen, with 16 strings, made of yew<sup>257</sup> with inlaid filets"<sup>258</sup>. Both instruments are initially recorded as entrusted to Georg Reyßmüller, one of the lute players of the chamber orchestra. A subsequent entry (no. 53) written with different handwriting indicates that the first lute previously in the custody of Georg Reyßmüller had been handed over to Benedict Ruinoth on 29th December 1590, after Reyßmüller was fired.<sup>259</sup>

Additionally, Lütgendorff mentions two purchase orders by the *Hofkapelle* to acquire instruments by Rauwolf, one in 1585 for "middle and octave lutes" costing 23 fl. 48 kr. and one for a *pandura* acquired in 1610.<sup>260</sup> It is not clear if the two lutes ordered in 1585 are the same two previously described.

At least three of the surviving lutes have the words *manum propa* written on the label, and under *propa* there is a brachygraphic sign to indicate an abbreviation of the word *propria*. The Latin term *manum propria* translates as "own hand", which meant this lute was made by Rauwolf himself. The fact that he felt it necessary to clarify this could be interpreted as evidence of the employment of a journeyman or an apprentice. However, at the present time, no archival source has been found to corroborate this assertion. Of the three instruments that lack this wording on their label, one is lute 1577 which is a very early

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<sup>255</sup> In this entry the neck is described as *krummen kragen*, which is rather difficult to translate directly to English, but the closest translation is bent, curved, or crooked.

<sup>256</sup> Golly-Becker, 216.

<sup>257</sup> *Eybin holz* in the original text. This has been previously translated in Lütgendorff's *Die Geigen Und Lautenmacher Vom Mittelalter Bis Zur Gegenwart* as Ebony, nowadays spelled *Ebenholz*, but it can also be interpreted as *Eibenholz*, the current German word for Yew.

<sup>258</sup> *fülletlen eingelegt* in the original text.

<sup>259</sup> Golly-Becker, 217, 229.

<sup>260</sup> Willibald Leo Lütgendorff, *Die Geigen Und Lautenmacher Vom Mittelalter Bis Zur Gegenwart*. third edition. (Frankfurt am Main: Frankfurter Verlags-Anstalt A. G., 1922), 405

example of Rauwolf's work, a second one is the Undated instrument which is missing its label completely, and on lute 1612 the label is partially missing. However, on the tear of the lower section of the label, there are traces of calligraphy that could indeed be the words *manum propria*.

As previously discussed, all of Rauwolf's lutes were modified to keep up with musical trends. This was a rather common practice; when a well-built and functional lute was rendered obsolete by the demands of new music – often due to an increase of the number of courses required to play the newly written pieces – it was refurbished rather than just replaced with a new instrument.

However, all the modifications to which they were subjected help us to better understand the trajectory they followed, allowing us to put together a historical record, not only of the instruments themselves but of the music trends in different periods of their existences.

The active period of Sixtus Rauwolf as a lute maker can be established as between 1577 and at least 1625, thanks to the nuptial permit and the first known instrument, both dated 1577, and the legal action he took against Baltasar Schuster in 1625.

### **Documenting the extant lutes by Rauwolf**

Documenting comprehensively each of the instruments in their present condition is vital to piece together this record and to reach out for their now lost original state. In order to better understand the work and ideas of Sixtus Rauwolf all the known extant lutes have been thoroughly documented, and all their parts exhaustively recorded regardless of whether they were originally made by Rauwolf.

In every instance the instrument was measured,<sup>261</sup> photographed, and a detailed draft was traced.<sup>262</sup> Depending on the availability of additional resources and information, supplementary data was collected on individual cases. This included provenance, restoration treatment reports, dendrochronological analysis, X-ray, ultraviolet (UV), and endoscopic imaging.

To accomplish the dimensional record of each of Rauwolf's lutes, an initial draft was made, tracing the instrument by hand with pencil on a sheet of polyester drafting film;<sup>263</sup> it included all the measurements, outlines, transversal sections of the body and the neck, as well as the position and dimensions of the rosette, bridge, decoration, etc.

To allow the precise measuring and recording of the dimensions of the lutes and their parts, the strings were carefully removed and documented. Once the process was finished the string were replaced as initially found.

To trace the outline of the body, the instrument was placed with the soundboard facing down on top of the drafting film, resting on four pieces of synthetic rubber of the same height. The reasoning behind these rubber supports was to ensure the soundboard was parallel to the drawing surface, which could not be accomplished otherwise due to the bridge, strings, and sometimes the angle of the neck.

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<sup>261</sup> All measurements were made in millimetres with a precision of 0.1mm.

<sup>262</sup> The draft for the Undated instrument was drawn by Michael Lowe and provided to the author by Stephen Gottlieb in 2009.

<sup>263</sup> Mylar was selected for being a dimensionally stable material. Also, its semi-translucent characteristics allowed retracing sections whilst overlapping drawn sections on different sheets or directly on the instrument to compare and confirm accuracy.

Once the instrument was positioned, the outline was traced using a small try square to which a 0.5mm pencil lead was secured using transparent, cellulose-based, pressure-sensitive tape.<sup>264</sup> This system was employed to ensure the lead was unequivocally perpendicular to the drawing surface, therefore producing an accurate tracing of the outline. The transparent tape protected the lute from the lead and the square. In further references, for lack of a better name, this device will be referred to as a 'drawing-square'.

Because of the lack of straight lines in the geometric construction of the lute's outline, determining the precise position of the bridge, rosette, and decorative elements on the soundboard is a rather complex exercise. The centre-line of the instrument would provide a straight line which in theory aligns with the centre-joint of the soundboard; however, this ideal scenario is not always present, nor reliable. The centre joint often does not correspond with the symmetric axis of the lute; in some cases the soundboard is made of more than two pieces assembled in a non-symmetrical way, and most lutes are not actually symmetric, either due to manufacturing mistakes or deformations suffered throughout time. Furthermore, the line of the centre-joint can be easily mistaken with one of the growth-rings of the coniferous wood employed for the construction of the soundboard.

After tracing the outline of the lute and whilst the instrument was still on the drawing surface, the accurate location and angle of the bridge was documented by placing a plastic ruler against the front of the bridge following its entire surface longitudinally, extending to overhang beyond the outline of the soundboard. The drawing-square was used to trace the protruding edge of the ruler on both sides of the instrument. After this, the lute was removed and the

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<sup>264</sup> Sellotape®.

two lines were connected across the soundboard. This line defines the angle and the end line of the bridge. Using this line on the drawing as a reference, and the plastic ruler and calliper on the instrument, comprehensive measurements of the bridge could be accurately transferred to the drawing and recorded.

Next to be documented was the location and dimensions of the rosette. Although the rosette in all lutes is intended to be a circle, the anisotropic characteristics of the wood<sup>265</sup> cause a directional shrinkage of the soundboard width-wise. Therefore the rosette was measured in both width and length with a calliper.

Establishing the location of the rosette within the soundboard presents challenges similar to the bridge. Often in technical drawings of lutes the rosette is drawn with its centre in correspondence to the centreline of the soundboard, assuming this positioning to be accurate. However, studying a number of Renaissance lutes proved this is often not the case. To record the accurate position of the rosette on the drawing, a second tracing of the outline was created on a separate sheet of drawing-film following the technique previously discussed. The lute was then placed with the soundboard upwards and the tracing presented against it. Because of the translucent characteristics of the drawing-film material the tracing of the outline could be matched with precision to the outline of the instrument. The precise location of the rosette was then registered in the drawing-film by demarking its border<sup>266</sup> with small pencil marks. This was transferred to the main draft and cross-examined with

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<sup>265</sup> The swelling and shrinkage of wood as a result of changing moisture content. Movement in length is always negligible. Movement parallel with the growth rings is greater than at right angles to them.

<sup>266</sup> Only width and length were marked to minimize the tracing on top of the instrument.

the measurements taken with the calliper. A similar system was employed to record the decorations of the soundboard; they were measured and then carefully traced on the drawing film.

The shape of the back of the body is a complex geometric irregular solid composed of multiple curves, and measuring it accurately was without doubt the most challenging part of the documentation process. The use of modern technologies like CT-scanning<sup>267</sup> or 3D-scanning would expedite and make this process more accurate. Unfortunately none of the institutions or the private collectors hosting the studied lutes had such technologies available at the moment the documentation took place. Therefore to record this three-dimensional body in a two-dimensional medium, it was decided to obtain a number of transversal cross sections and one longitudinal section following the centre line of the back.

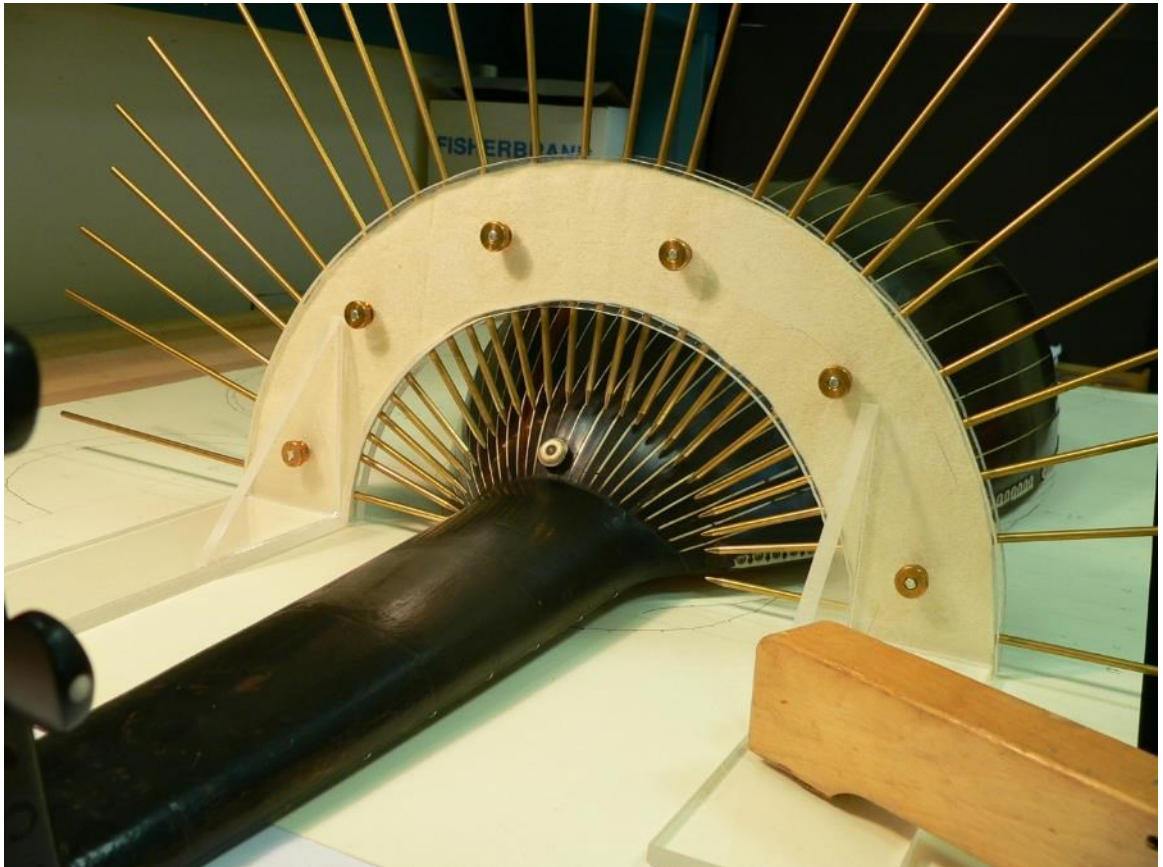
This was accomplished with a system suggested by Tiziano Rizzi in which a pointing-device is employed to obtain a number of aligned points in correspondence to the joints between ribs at a specific section of the body.<sup>268</sup> There were three of these pointing-devices employed for measuring each instrument, one for the longitudinal section, and two for the transversal sections (one large for the widest area, and one smaller for the area closer to the neck). The devices were constructed as follows: for the cross sections, a frame made of two semi-circular pieces of acrylic (6mm thick), placed against each other separated by a layer of felt (3mm thick) and secured using six countersunk-head bolts with knurled thumb nuts. Brass rods with round pointed ends (as many as the number of ribs in the lute plus one) were enclosed

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<sup>267</sup> CT stands for 'computer tomography'.

<sup>268</sup> Similar systems have been used by multiple researchers, e.g. Stephen Barber (<http://www.lutesandguitars.co.uk/htm/cat01.htm> consulted on 04/01/2016)

between the felt and one of the acrylic sides with their pointed ends facing the inner side of the u-shaped frame. The felt was placed so the rods could slide to protrude more or less by pulling them or pushing them but without moving by themselves. The bolts could be tightened to compress the two sides of the frame and fix the rods in a desired position. Supports were fixed to both ends of the frame at a 90° angle to allow it to stand perpendicularly to the surface (*Figure 48*).



*Figure 48.* Device to document the cross sections of the back.

For the longitudinal device, instead of a u-shape, the frame was made following an outer contour of one half of the drawn outline of the body at ca. 50mm from it. The number of rods used for this device was arbitrary and the rods were approximately equidistant from each other. The 90° support of the upper end (the one closest to the neck) had a sort of buttress to allow the frame to reach the centre line without touching the neck.

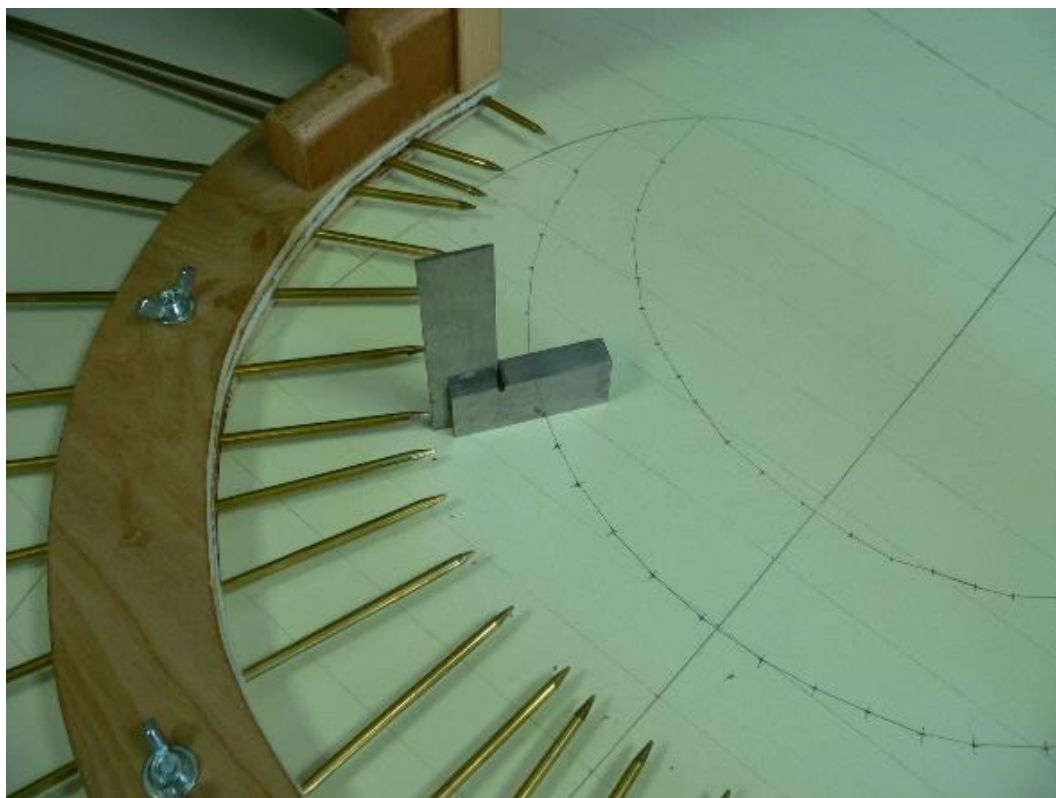
The number of recorded sections varied from lute to lute and depended on the time available for its documentation. For the 1596 lute 18 sections were taken (one every 25mm); in contrast for the lutes 1593 and 1598 only seven sections were taken. In all cases two sections were taken at specific locations, one at the point of maximum width, and another one at the point where the body meets the neck. The rest of the cross sections were spread throughout the body length.

To record the transversal sections, first the centreline of the body was traced in the drawing, then a number of transversal lines extending beyond the outline of the lute were traced perpendicularly to the centreline and in correspondence with the defined cross sections. The lute was then placed again in correspondence to the drawn outline. The pointing-device was then set in correspondence to one of the transversal sections by lowering the point of the last rod in each side of the frame and aligning it with the traced line. Once this was achieved, the pointing-device was fixed in place either by clamping its support to the table or by placing weights on top of the support. The pointing rods were carefully driven to touch each of the spacers at the joints between ribs, the last two touching the edge of the soundboard. Once the rods were in place the thumb-nuts were tightened and the frame was carefully removed by sliding it towards the sloping end of the instrument.<sup>269</sup> The pointing-device was then laid down against the drawing surface and the position of the point of each rod was transferred to the drawing-film using the drawing-square (*Figure 49*).

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<sup>269</sup> Towards the neck for the sections between the widest part and the neck, and towards the bottom for the sections between the widest point and the lower end.





*Figure 49. Transferring the cross section to the drawing film.*

The longitudinal section was recorded by placing the appropriate pointing-device aligned with the centre-line of the back, following the middle of the centre rib and bringing the points of the rods to barely touch the instrument. The first rod was placed touching the joint with the neck, the last one touching the edge of the soundboard on its centreline, and the rest of the rods were placed roughly equidistant from each other covering the entirety of the profile of the body, making sure that a rod was placed directly at the edge of the end clasp to register its widest point. As with the transversal sections, once the rods were in place, the thumb-nuts were tightened, the frame removed, and the points transferred to the drawing-film.

To complete the side-view profile of the instrument, the curvature of the soundboard was recorded using a plastic profile gauge following the centreline. Because the length of the profile gauge is smaller than the soundboard, several imprints of the centreline were taken to account for the

full length of the body. These imprints were then transferred to the drawing-film.

Cross sections of the neck were taken on at least three points; one at the joint with the back, one at the joint with the back of the peg box, and one between the previous two. These were recorded using either the same pointing-device or a plastic profile-gauge. The width and height of the neck were measured with a calliper at the same spots to cross-reference the transversal sections. The longitudinal section of the neck was recorded using the plastic profile-gauge.

The pegbox was measured thoroughly and recorded on the drawing-film. Its angle with respect to the neck was determined by placing an angle protractor against the centreline of the back of the neck and measuring the angle at the centreline of the pegbox.

A detailed digital photographic record was created for each of the instruments. This included front, back, and side views of the whole instrument, as well as close-up images of the particular details. Additional UV, endoscopic, raking light, and X-ray imaging was also obtained when available.

The hand-drawn draft was scanned at a 1:1 proportion<sup>270</sup> at a 300dpi definition and saved as a TIF file. This digital version of the draft was exported to graphic design software.<sup>271</sup>

The pencil lines of the scanned file were redrawn digitally at 1:1 scale following the inside of the line to compensate for the thickness of the adhesive film covering the pencil lead of the drawing-square. The CDR tool used to draw

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<sup>270</sup> Control lines in at least two directions were drawn in the draft indicating specific measurements to ensure the accuracy of the scanned version with respect to the original.

<sup>271</sup> Corel Draw® software (CDR). This software was chosen due to its versatility, accuracy, and the ability to include different media whilst drawing on-scale.

these lines allows complex curves based on vectors and constructed with as many nodes as necessary. The digitally drawn lines followed the deformations of the object accurately rather than drawing arbitrary straight lines and regular curves based in specific radiuses. The two-dimensional digital depiction of the object was then a portrayal of its actual state at present and not an ideal version of how it would be if its curves were regular and symmetrical.

The specific dimensions of the digitally drawn parts were established using the CDR dimension tools. All measurements were compared with and adjusted to the recorded physical measurements taken with callipers and rulers to ensure accuracy.

In the specific case of the 1596 and 1612 lutes, the information of the internal bracing provided by the X-ray images was also included. It is worth noticing that the equipment and technique employed to obtain the X-ray images has an inherent photographic optical aberration. Therefore the location and dimensions of the objects drawn after the X-ray images are for reference only.

The digital version of the drawing of lute Undated was generated following a similar procedure, but it was obtained from the drafts drawn by Michael Lowe.<sup>272</sup> Because this lute was documented during a restoration treatment, this drawing includes information like the thickness chart of the soundboard and the precise location of the bracing, which was not available for the other instruments.

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<sup>272</sup> Kindly provided by Stephen Gottlieb, and used under express authorisation by Michael Lowe.



## Extant lutes by Sixtus Rauwolf

1577, Fuggermuseum im Schloss, Babenhausen



*Figure 50. Lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.*

This is the oldest known surviving lute made by Sixtus Rauwolf and it was made for Jakob Fugger in 1577, the year Rauwolf married Margareth Schlaurin. Taking into account the guild regulations in Augsburg, marriage was ideally planned to coincide with the completion of a masterpiece, in order to become a

master.<sup>273</sup> It is likely that by marrying and completing this instrument Rauwolf became a master that year, and therefore he was able to take commissions directly from the clients and to sell instruments bearing his label inside. The fact that he made this instrument for a member of the Fugger family is remarkable. The Fuggers were one of the richest and most important families in Renaissance Europe and the commission of a lute by Rauwolf can be interpreted as an endorsement of a well appreciated craftsmanship from early in his career.

The Fugger family had begun to accumulate their enormous wealth in the second half of the fourteenth century as cloth merchants, and built up their fortune until – by the first half of the sixteenth century – they ran the banks in Augsburg and had a monopoly throughout Europe on silver and copper, with mines in Spain, Hungary, and Austria. They were leading players in the expansion of trade, providing funds and resources for the establishment of colonies in the New World and financed major expeditions for exploration and commerce. They secured the import rights of a large number of raw materials from the New World through lending considerable amounts of money to the Holy Roman Emperors, and by financing the imperial election of Charles V in 1519.<sup>274</sup>

The Fugger family were established patrons of the arts, particularly music, both in Augsburg and throughout Europe, and influenced the history of music itself.

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<sup>273</sup> Tlusty, 136. As part of the benefits of belonging to the guild a master was allowed to marry and to establish an independent household.

<sup>274</sup> Kluger, 21.

Amongst the composers who dedicated works to the Fugger family were Giovanni Gabrieli, Hans Leo Hassler and Philippe de Monte.<sup>275</sup>

Raymund Fugger was an avid collector of musical instruments, with a particular interest in lutes. However, since Raymund died in 1569, the lute 1577 by Sixtus Rauwolf was obviously not part of his collection. It was the property of Raymund's cousin, Jakob (1542- 1595). This attribution of ownership is deduced from the decorative elements in the construction of the lute. The lower section of the soundboard is decorated with an inlaid *fleur-de-lys* symbol of the branch of the family known as *Von der Lilie* (Figure 52); and the ornate rosette—carved in pear-wood<sup>276</sup> and inserted in the soundboard—with the family coat of arms at its centre, surrounded by the phrase: *HER IACOB FUGER H[ER] ZU KIRCHBERG VND W[IR]TSSENHORN § 1577 §* (Figure 51).

The Jakob Fugger that owned this lute should not to be mistaken with his namesake greatuncle Jakob 'The Rich' (1459 - 1525), the most famous member of the Fugger family, who was not only a merchant, mining entrepreneur and banker, but a great social innovator. Instead this other Jakob appertains to a period in the history of the firm that Fugger researchers describe as a time of decay;<sup>277</sup> the leadership of the firm was inherited by Anton Fugger's sons, Marx, Hans, and Jakob. However, it was Marx and Hans who were responsible for the management and administration of the firm; apparently Jakob was not very involved with the running of the company and in 1569 Hans describes him

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<sup>275</sup> Mark Häberlein. *The Fuggers of Augsburg: pursuing wealth and honor in Renaissance Germany* (Charlottesville and London: University of Virginia Press, 2012), 101

<sup>276</sup> The wood species was determined by macroscopic examination. No microscopic analysis was carried out to determine this with certainty.

<sup>277</sup> Richard Ehremberg. *Das Zeitalter der Fugger: Geldkapital und Creditverkehr im 16. Jahrhundert*, 2 vols. (Jena, 1896).



as rather lazy, prone to spending time with loose company, and constantly absent from the office.<sup>278</sup>



Figure 51. Carved rosette of lute 1577 with the coat of arms of Jakob Fugger. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

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<sup>278</sup> Christl Karnehm. *Die Korrespondenz Hans Fuggers von 1566 bis 1594: Regestren der Kopierbücher aus dem Fuggerarchi* vol.1 (Munich, 2003), 356.





Figure 52. Coat of arms of the Fugger Von der Lilie.<sup>279</sup>

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<sup>279</sup> Fuggerorum, 2r.

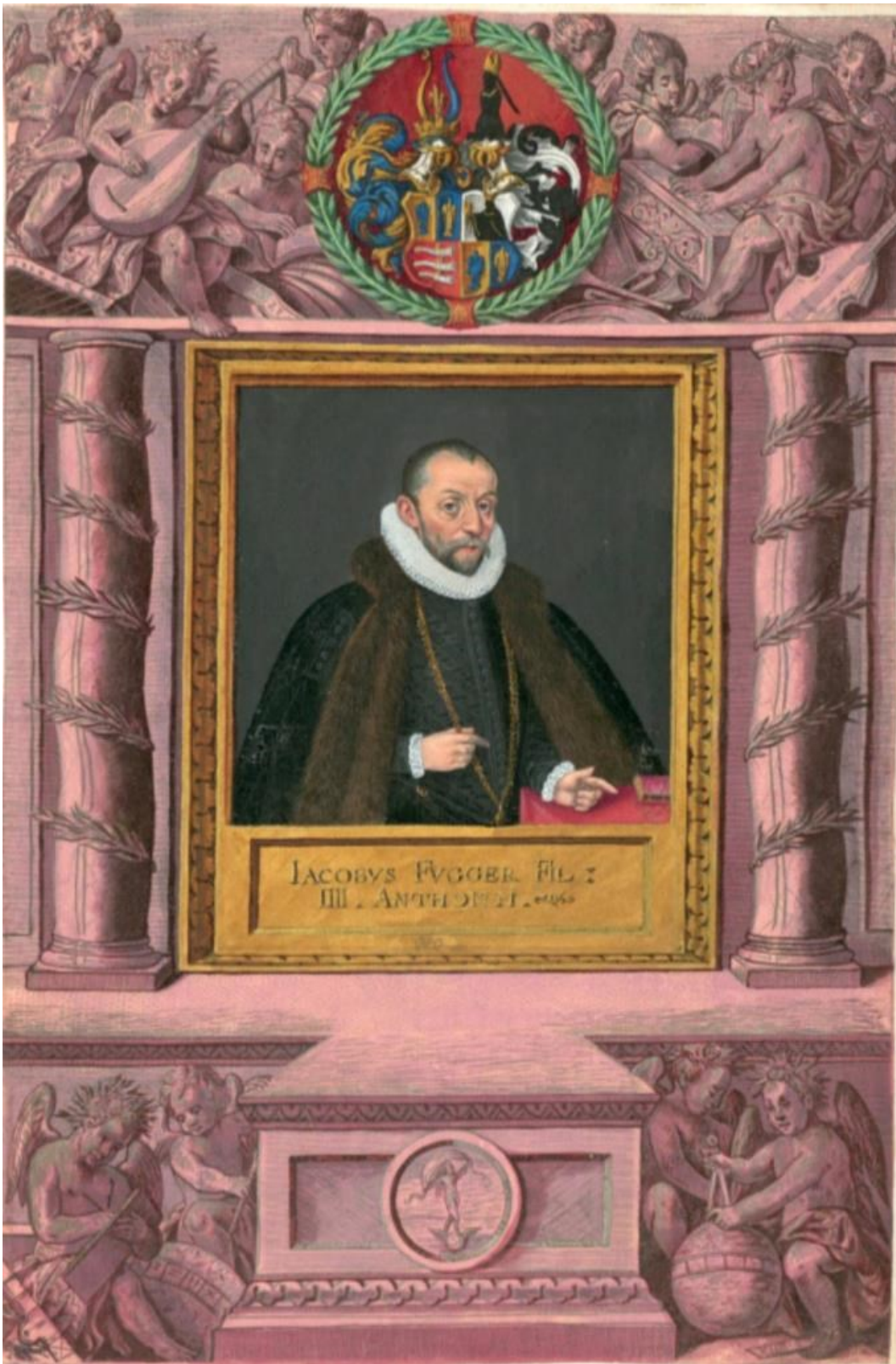


Figure 53. Portrait of Jakob Fugger in the Fuggerorum, 1618.<sup>280</sup>



Anton Fugger laid emphasis on the education of his sons, providing them with a broad humanistic schooling. In his will of 1550 he states that his sons should “continue to study and travel with learned men as tutors as well as learn foreign languages”.<sup>281</sup> Therefore from early in his life Jakob received a humanistic oriented education provided by private tutors, which most likely included music, literature, history, and philosophy.



Figure 54. Portrait of Jakob Fugger, probably by Abraham del Hel, ca1580. Fuggermuseum im Schloss.

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<sup>280</sup> Custos, Dominicus, Lucas Kilian, Wolfgang Kilian, and Matthias Kager. *Fuggerorum. Et Fuggerarum. Quae In Familia Natae Quaeve In Familiam Transierunt. Quot Extant Aere Expressae Imagines.* (Augsburg, 1618), 82r.

<sup>281</sup> Häberlein, 99.

According to Markus Graf Fugger,<sup>282</sup> the current family member responsible for the Fuggermuseum in Babenhausen, this instrument remained in the family's collection from its purchase in 1577 to the early 1930s when it was sold by his grandfather Fürst Georg Fugger von Babenhausen,<sup>283</sup> probably due to the ruinous inflation that followed the First World War.

It is unclear who bought the lute from the Prince, but apparently this instrument was later owned by Franz Julius Giesbert,<sup>284</sup> who was one of the pioneers of the Early Music revival in Germany the early 1930s. Giesbert was a musicologist and composer, as well as a lute and recorder performer. He was also an active publisher and editor of music, including methods for recorder and lute.<sup>285</sup> On his *Schule für die Barocklaute* published in 1939, Giesbert lists the instruments in his collection, which includes the Rauwolf lute.<sup>286</sup>

In 1982 the Cologne art dealer, Bernhard von Hühnerbein Alte Musikinstrumente GmbH,<sup>287</sup> had this lute for sale and approached the Fugger family. After close examination by Markus Graf Fugger its authenticity was determined and the lute was purchased back by Fürst Hubertus Fugger who brought it back to Babenhausen to form part of the Fuggermuseum collection where it is still held now.

The Fuggermuseum was founded by Prince Leopold Fugger in 1885; it was housed in the *Fuggerhaus* in Augsburg, which opened its doors to the public in

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<sup>282</sup> Informal conversation at the Fuggermuseum im Schloss in June 2007, and telephone conversation in December 2016.

<sup>283</sup> The sixth Prince Fugger von Babenhausen.

<sup>284</sup> This was brought to my attention by Klaus Martius in an email exchange regarding Friedmann Hellwig's archives.

<sup>285</sup> Friedrich von Huene, "A Visit with Franz Julius Giesbert", *The American Recorder: A Journal for Early Music* vol. XXIV no. 3 (August 1983): 107.

<sup>286</sup> Franz Julius Giesbert, *Schule für die Barocklaute* (Verlag B. Schott's Söhne: Mainz, 1940), 15.

<sup>287</sup> Bernhard von Hühnerbein – Alte Musikinstrumente was an antiques dealer specializing in musical instruments in Cologne, no longer in business.

1908. After its closure due to the Second World War, the museum was relocated in 1955 in the Fugger castle in Babenhausen, which dates back to the time of Anton Fugger who acquired dominion of Babenhausen in 1539. The current museum holds a significant collection of objects and documents related to the Fugger family, including a small number of musical instruments.

### Description of the instrument

There are five labels glued to the back of this lute, one handwritten by Rauwolf:

Sixt Rauchwolf von / Augsburg A<sup>o</sup> 1577 §<sup>288</sup>



Figure 55. Label by Rauwolf. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

Four additional labels attest different stages of renovations and repairs. They read in chronological order:

- *Renofierd* / Gregori Ferdinand Wenger / Lauten und Geigen=Macher / in Augspurg 1705 (Figure 56)
- *Reparavit* / Joannes Friderich Storch, / Lauten- und Geigen- Macher / Fecit Augustae 1764 (Figure 57)
- Xaver HiderStößer / *reparirt* Augsburg 1869 (Figure 58)
- Josef Nairts / Geigenmacher / MUENCHEN 1933 / *repariert* (Figure 59)

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<sup>288</sup> "A<sup>o</sup>" is an abbreviation for *anno*, the Latin word for year.



Figure 56. Label 2. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

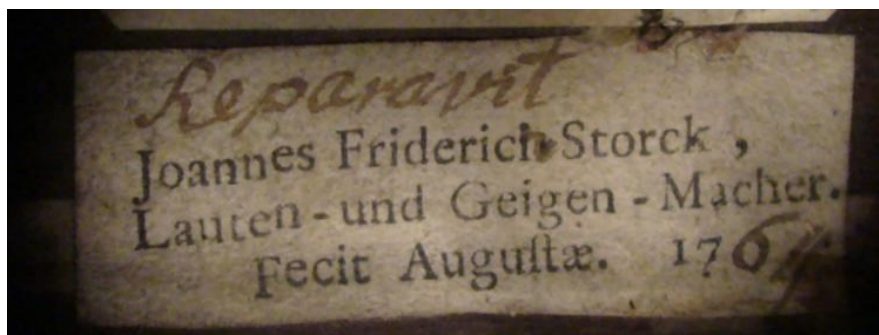


Figure 57. Label 3. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.



Figure 58. Label 4. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.



Figure 59. Label 5. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

Thanks to these labels it can be inferred that the lute stayed in Augsburg until the first half of the twentieth century, confirming the timeline provided by Graf Markus Fugger. The last label places the instrument in Munich in 1933 being repaired by Josef Nairz II, who was son of the instrument maker Josef Nairz I, and died in 1944.

Around the beginning of the eighteenth century new lute music – in particular that by Silvius Leopold Weiss – required an instrument with thirteen courses, of which the first seven ran over the fingerboard and were meant to be stopped with the left hand, and the five lower courses were attached to an extension of the pegbox and played as unstopped bass drone notes. The interesting and curvilinear shape of this pegbox extension gave the name ‘swan-neck lute’ to this type of instrument. Many old lutes were ‘modernized’ to comply with these new requirements, by replacing the old neck with a wider one, the pegbox with the described neck extension, and substituting the bridge with a longer one in order to accommodate the extended number of courses. This lute by Rauwolf was most likely conceived as a six- or seven-course instrument in 1577, but it underwent modernization which turned it into a thirteen-course ‘swan-neck’ lute, in all likelihood by Gregori Ferdinand Wenger in 1705, as indicated by the label inside the instrument in which the word “Renofierd” appears.

The current neck is made of an unidentified wood veneered in ebony, and it has an arched ebony fingerboard which by its shape and style can also be attributed to Wenger. The present neck is evidently thinner than the original, causing a gap at the joint of the neck with the body. This gap was filled with some sort of wood paste and coloured to match the neck. Tool marks in this area are evidence of the numerous modifications this instrument underwent.

The neck extension allows for thirteen courses—all of them double—distributed in two pegboxes, the first housing eight and the second the remaining five. It is formed of two sections, the second pegbox being grafted to

the end of the first one (*Figure 61*). It is coated with a dark brown varnish and has clear signs of significant woodworm damage, some of it partially repaired via wood fillers. There are two open perforations in the base of its back, probably remnants of a strap-holder currently missing.



*Figure 60.* Neck extension of lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.



*Figure 61.* Side view of Neck extension of lute 1577 highlighting the graft of the second pegbox. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

The second pegbox has five uniformly distributed perforations in between the pegs on the upper face of one of its sides, all of them filled with wooden dowels



(Figure 62). Most likely these dowels were intended to reinforce the repair of a fracture of the pegbox wall running with the grain of the wood from peg-hole to peg-hole.



Figure 62. Upper pegbox highlighting the wooden dowels. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

At least four kinds of pegs of dissimilar shapes and sizes are present in both pegboxes, probably dating from the different iterations.



Figure 63. Different pegs from lute 1577. Photographed by Jonathan Santa Maria Bouquet, 2007.

There are clear traces of nine gut frets on the neck – seven of them still tied to the neck and the fourth and eighth currently missing – and five additional

wooden frets glued to the soundboard – the fourth currently missing. These wooden frets are located at unusual intervals, the distance between the eleventh and twelfth frets being significantly larger than that between the tenth and eleventh or twelfth and thirteenth (*Figure 64*).



*Figure 64.* Detail of the wooden frets on the soundboard. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

The body is made of thirteen ribs of hardwood with light-coloured wood spacers (*Figure 65*). Regrettably, the material of the back could not be subjected to scientific analyses which might have led to an accurate identification. Due to the way the material is cut and arranged in the construction of the back of any lute, there is no access to the appropriate sections<sup>289</sup> of the wood to undertake a microscopic analysis in situ. Alternative techniques to provide accurate wood

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<sup>289</sup> To obtain a reliable wood identification analysis, it is necessary to observe the material in three different sections: radial, tangential, and cross section.

identification like DNA analysis require the removal of samples to be analysed, and therefore from the conservation standpoint are unsuitable and should be avoided. More technologically advanced options like X-ray micro tomography (micro-CT or  $\mu$ CT) would provide very accurate results; unfortunately this technology was not available for the study of any of the instruments in this project. The woods employed for the construction of each instrument were thus determined through macroscopic observation, and based in the knowledge of the author and cross-referencing wood identification image databases.

Following this criteria it was established that the wood of the back of this lute is clearly an angiosperm of a warm red colour with an interesting figured grain, in the radial section the rays are visible as tiered. It appears to be Guayacan (*Handroanthus guayacan*),<sup>290</sup> or Brazil-wood (*Caesalpinia echinata*),<sup>291</sup> a material used to describe a bass lute and “a set of three lutes in the Fugger inventory”.<sup>292</sup> Both wood species grow in Central and South America, and they are the earliest New World plants to show up on apothecary price lists in the Holy Roman Empire, the first a widely used medicine and the second used only for red inks and dyes.<sup>293</sup>

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<sup>290</sup> Previously known as *Tabebuia Guaiacan* and often mistaken for *Guaiacum Officinale*, also known as Lignum Vitae or Ligno Sancto because of its presumed medicinal properties.

<sup>291</sup> Also known as Pernambuco and *pau-brasil*. The term Brazil Wood is a generic term and it has also been used to describe Rosewood (*Dalbergia nigra*).

<sup>292</sup> Smith, Appendix II, 319. Entries 15 and 28 of the inventory. In addition the inventory includes “A small harpsichord of Brazil wood by Francesco Ungaro of Venice” and “Six cornetti of Brazil wood in their case”.

<sup>293</sup> Gail Marlow Taylor, "Putting Down Roots: The Reception of New World Medicinal Plants in Early Modern Germany, 1492-1648." Order No. 3627219, University of California, Irvine, 2014.



*Figure 65. Back of lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.*



*Figure 66. Decorative end of the clasp. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.*



The clasp is made of the same material as the ribs, and its decorative ends are atypical for Rauwolf, probably as it is a very early example of Rauwolf's work (*Figure 66*).

There are two bone strap-buttons inserted into the back, one in the center rib in the vicinity of the neck joint, and one in the middle of the clasp (*Figure 67*).



*Figure 67. Strap-buttons on lute 1577*

The bridge appears to be made of pear-wood stained dark brown, and currently it has over thirty six string-holes of very diverse diameter. Presumably this is the result of multiple modifications made at different stages to accommodate various configurations and distances between strings and courses, making it very difficult to ascertain in which particular iteration it was made (*Figure 68*). Nonetheless, the manufacturing style, the kind of wood and the way it is stained could suggest it dates from the same intervention as the neck extension.



*Figure 68. String-holes in the bridge of lute 1577. Photographed by Jonathan Santa Maria Bouquet, 2007.*

A very similar situation can be found in the nut of the first pegbox, where multiple notches were cut at different stages for different string configurations, making the interpretation of these parts virtually impossible (*Figure 69*).



*Figure 69.* Notches in the nut of lute 1577. Photographed by Jonathan Santa Maria Bouquet, 2007.

The soundboard is made of two pieces of spruce of very narrow regular grain, radially-cut and bookmatch-joined. It has a double purfling separated by approximately 10mm, each of them formed by two strips of stained wood separated by a light coloured wood, similar to those used in violin making. The same kind of purfling surrounds the rosette. In addition the outline of the body is partially surrounded by a pear wood binding.

Raking-light imaging of the soundboard makes evident numerous cracks, deformation, and wear marks near the bridge (*Figure 71*). Ultraviolet light imaging shows clear evidence of repairs made with different adhesives,<sup>294</sup> most likely the result of several treatments, including partial repairs to the rosette, as well as the replacement of a substantial section of the lower area of the

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<sup>294</sup> Different adhesives have distinctive fluorescence colour and brightness under ultraviolet light.

soundboard from the second purfling to the edge (*Figure 72*). This replaced section is also evident under natural light since the growth rings do not match those of the soundboard (*Figure 70*).



*Figure 70.* Detail of the lower section of the soundboard of lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.



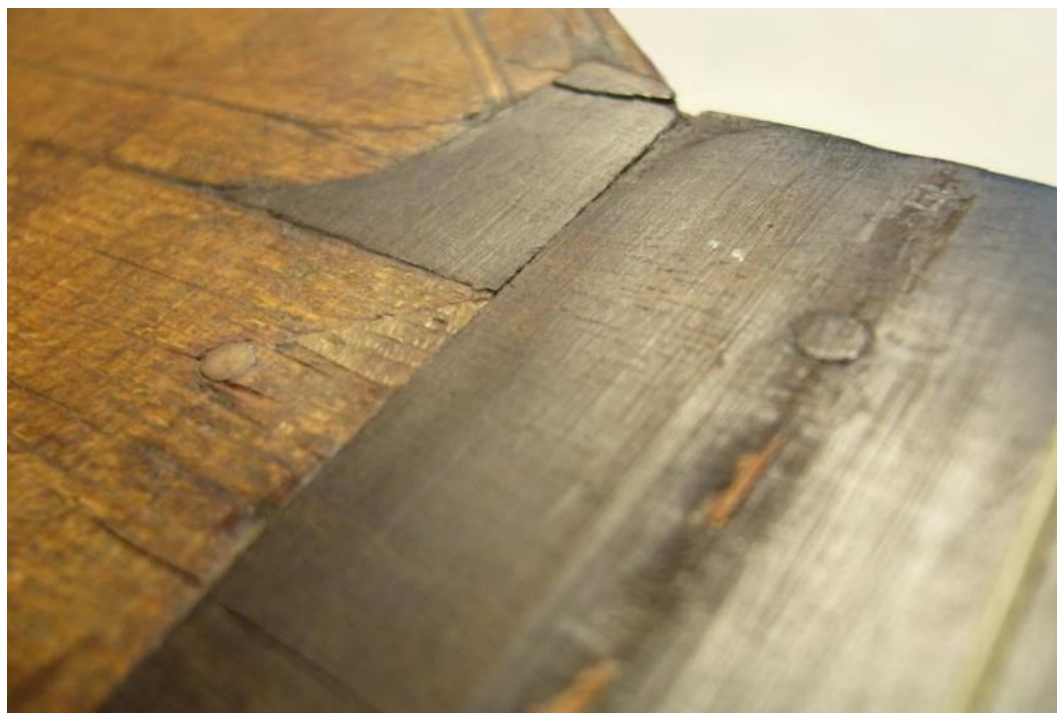
*Figure 71.* Raking-light image of the soundboard. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.





*Figure 72.* Ultraviolet image of the soundboard. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

There are two wooden dowels inserted into the section of the soundboard that overlaps the neck, and two more in the fingerboard. The purpose of these dowels is not clear but they might be remnants of a previous repair. There are also two triangular wood insets, which are probably the remnants of the previous decorative ends of a narrower fingerboard (*Figure 73*).



*Figure 73.* Detail of wooden dowels in the neck-body joint area of lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

The decorative *fleur-de-lis* inlaid on the bottom end of the soundboard is made of two pieces of wood, one of them forming the main body of the *fleur-de-lis* (probably made of rosewood) and a half circle at the bottom (made of ebony) which is most likely not original. A damaged section of this decorative element has been crudely repaired with some sort of wood filler. The four smaller spade-shaped inlays around the rosette are made of some sort of black paste (*Figure 74*).



Figure 74. Decorative *fleur-de-lis* inlay. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.

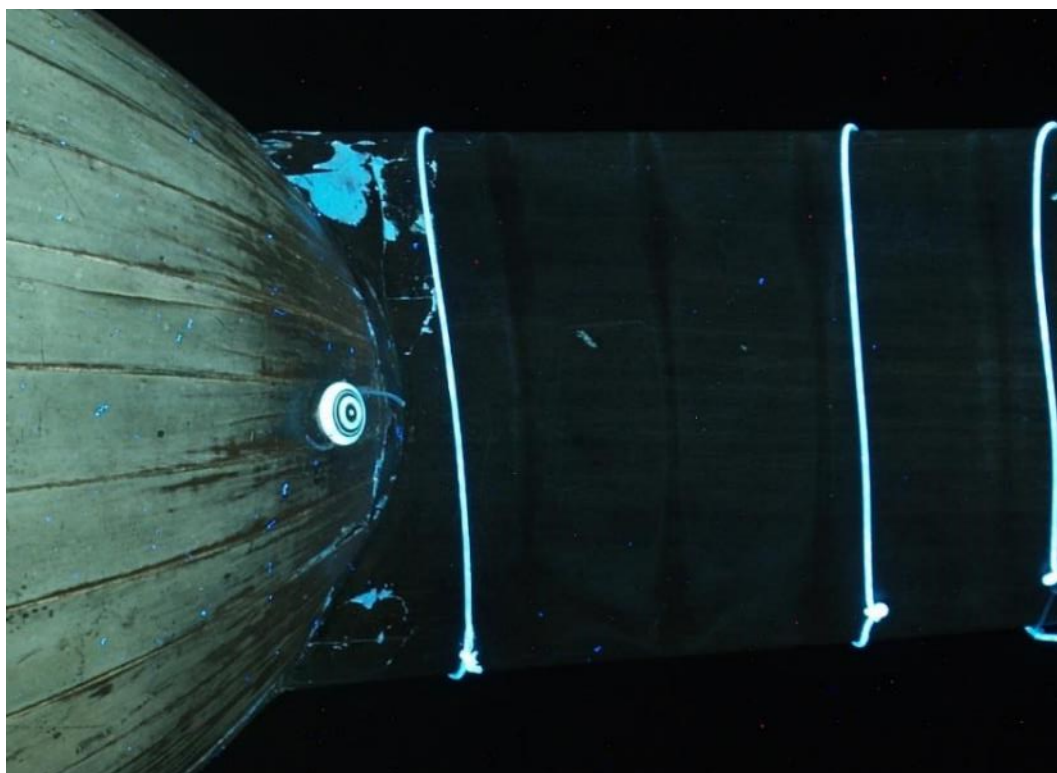
Ultraviolet imaging of the back of the instrument reveals at least three different varnish compositions used for individual sections of the instrument. The back is uniformly coated with a varnish which emits a bright greenish-white fluorescence, which might be indicative of an oil-resin based varnish (Figure 75). The coating used for the neck is significantly less bright under UV light; it has a pale, almost translucent fluorescence which seems to indicate some sort of wax coating, maybe beeswax. The places where the frets were tied to the neck do not share the same fluorescence and appear quite dark, which could indicate the neck was waxed with the frets on or that the rubbing of the frets has eroded the coating on those areas. The neck extension with the pegboxes is covered with a very irregular varnish which under UV light presents a yellowish fluorescence, and some sections of its front present traces of a repair which was covered with a different varnish (probably shellac) which presents an orange



fluorescence. Some of the pegs, probably dating from the same intervention, appear to be partially covered with a similar varnish (*Figure 77*).



*Figure 75.* Ultra-violet image of the back of lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.



*Figure 76.* Ultra-violet image of the neck of lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.



*Figure 77. Ultra-violet image of the pegbox of lute 1577. Photographed by Claudio Canevari, Silvia Zanchi, and Jonathan Santa Maria Bouquet, 2007.*



1593, Private collection Guy Oldham, London



Figure 78. Lute 1593. Photographed by Jonathan Santa Maria Bouquet.

This instrument was part of the important collection of musical instruments of the English collector and music scholar Francis William Galpin (1858 – 1945).<sup>295</sup> Galpin started collecting musical instruments whilst attending the University

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<sup>295</sup> Rosemary Williamson. "Galpin, Francis William." *Grove Music Online. Oxford Music Online*. Oxford University Press, accessed April 23, 2016, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/10591>.

at Trinity College, Cambridge and he made his collection available for public exhibitions and lectures.<sup>296</sup>

Photographs of Galpin's instruments appeared in several publications dedicated to musical instruments or music, including multiple plates of the third,<sup>297</sup> fourth,<sup>298</sup> and fifth editions<sup>299</sup> of the *Grove Dictionary of Music and Musicians*. The Rauwolf lute of his collection appeared in the plate illustrating the 'Lute' entry for the fourth and fifth editions<sup>300</sup> (p.433) and in *Old English Instruments for Music* in 1910 (*Figure 79*).<sup>301</sup>

Galpin was in charge of arranging the display of the Crosby Brown Collection for the Metropolitan Museum of New York in 1902, as well as the collection of the Stockholm Musikmuseet in 1903.<sup>302</sup> Both of these museums own instruments by Rauwolf, which means Galpin had direct contact with at least three of his known extant instruments.

In 1914 a significant portion of his collection, comprising more than 500 instruments, was transferred to the Museum of Fine Arts, Boston. The lute by Rauwolf in his collection was not part of this group of instruments.

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<sup>296</sup> Williamson. "Galpin, Francis William."

<sup>297</sup> George Grove, and Henry Cope Colles. *Grove's Dictionary of Music and Musicians*. Fourth Edition / Edited by H.C. Colles. (London: Macmillan, 1927).

<sup>298</sup> Colles, H. C., and George Grove. *Grove's Dictionary of Music and Musicians*. Fourth Edition / Edited by H.C. Colles. (London: Macmillan, 1948).

<sup>299</sup> Grove, George, and Eric Blom. *Grove's Dictionary of Music and Musicians*. Fifth edition / ed. Eric Blom. (London: Macmillan, 1954). An additional supplementary volume was published in 1961. The fifth edition was reprinted in 1966, 1968, 1970, 1973, and 1975.

<sup>300</sup> Grove fifth edition: vol. V, plate 42.

<sup>301</sup> Francis W. Galpin. *Old English instruments of music: their history and character*. (London, 1910), plate 10.

<sup>302</sup> Williamson. "Galpin, Francis William."





1. MANDORE OR LUTINA, EIGHTEENTH CENTURY. 2. PANDURINA BY M. A. BERGONZI, 1756. 3. LUTE BY SIXTUS RAUWOLF, 1593.  
4. THEORBOE BY MATHYS HOFFMAN, 1619. 5. ARCHLUTE OR CHITTARONE, ITALIAN, SEVENTEENTH CENTURY. 6. GUITAR BY CHAMPON, C. 1700.

Figure 79. Plate 10 of *Old English instruments of music: their history and character* by Francis W. Galpin. The lute on this plate, identified by the number 3, is lute 1593 by Sixtus Rauwolf.

Francis Galpin died in Surrey in December 1945, leaving no records of the provenance or acquisition of any of the instruments in his collection. The following year, the Galpin Society was formed to continue his work in the field of organology, "to further the study of the history, construction, development and use of musical instruments, and to preserve and make available material about instruments of the past".<sup>303</sup> Among its founding members were some of the most important organologists of the time, including Anthony Baines, Philip Bate, Robert Donington, Eric Halfpenny, Edgar Hunt and Lyndesay Langwill.<sup>304</sup>

After Galpin's death the remaining forty-six instruments of his collection were auctioned out by Puttick and Simpson in London. They were first advertised for the sale that took place on April 11<sup>th</sup> 1946; however, all forty-six lots were withdrawn from the auction only to reappear in the next auction the following August 1<sup>st</sup>. The Rauwolf lute was lot number six, and in the auction catalogue it is described as:

An eleven-stringed lute by Sextus Rauwolf, 1593, bearing label, with a carved head, the back inlaid with ivory lines, and carved rose. Illustrated in *Old English Instruments* by Rev. Canon Galpin.<sup>305</sup>

It was at this auction that it was acquired by Mr Guy Oldham, who is the current owner in London.

In 1959 a number of instruments from the Oldham collection, including this lute, were exhibited in The Senate House in Cambridge for the "Loan

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<sup>303</sup> "Galpin Society." *Grove Music Online. Oxford Music Online*. Oxford University Press, accessed April 23,

2016 <http://www.oxfordmusiconline.com/subscriber/article/grove/music/10592>.

<sup>304</sup> *Idem*.

<sup>305</sup> Puttick and Simpson auction catalogues of April eleventh and August 1<sup>st</sup>, London 1946.

Exhibition of Musical Instruments, Manuscripts and Printed Music".<sup>306</sup> This was an exhibition arranged by members of the Galpin Society and the International Association of Music Libraries (IAML) with instruments lent by private collectors and museums.

### Description of the instrument

Inside the instrument there is a handwritten label that reads:

SIXTUS RAUWOLF/ AUGUSTANUS 1593/ manum propria.



Figure 80. Label inside the lute. Photographed by Jonathan Santa Maria Bouquet, 2013.

It is remarkable that this label bears Rauwolf's mark or monogram. According to Friedemann Hellwig, these marks "originated as a visible guarantee of authenticity and value",<sup>307</sup> as a way to avoid forgery but also to regulate the trade where certified by local authorities like the guilds. This mark is also present in three other lutes by Rauwolf, imprinted onto the clasp with a branding iron; unfortunately, due to the placement of the brand within the clasp, these marks were partially damaged or obliterated by the later addition

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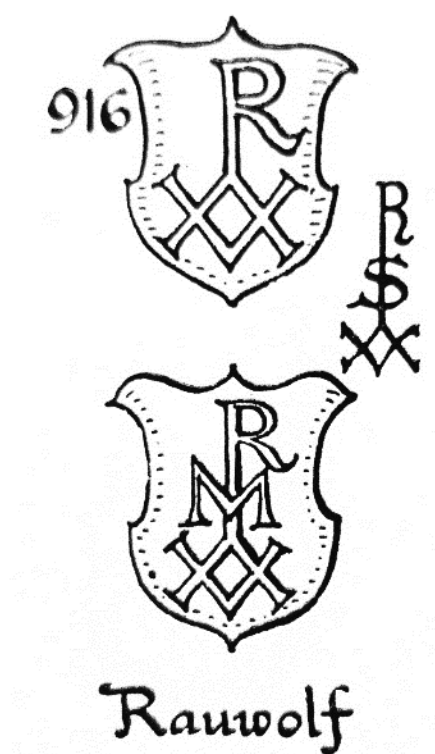
<sup>306</sup> "Catalogue of a Loan Exhibition of Musical Instruments, Manuscripts and Printed Music, Held in the Senate House, Cambridge, 30th June–third July, 1959." In Unity Sherrington and Guy Oldham, ed., *Music Libraries and Instruments: Papers Read at the Joint Congress, Cambridge, 1959*. 272–77. (London: Hinrichsen Edition, 1961), 272.

<sup>307</sup>Friedemann Hellwig, "Makers' Marks on Plucked Instruments of the sixteenth and seventeenth Centuries." *The Galpin Society Journal* 24 (1971), 22.

of strap buttons (*Figure 81*). The label of this lute is the only instance in which we can see Rauwolf's mark complete, and it is very similar to one of the variants of Rauwolf's monogram published in Zimmerman's book (*Figure 82*).<sup>308</sup>



*Figure 81. Monogram on label of 1593, and clasps of Undated lute.*



*Figure 82. Rauwolf's monogram as published by Zimmermann. Zeichen 916.*

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<sup>308</sup> Zimmermann, Zeichen 916.

The original neck was replaced in all probability in the late seventeenth or early eighteenth century with a wider neck. The decorative ends or *points* of the fingerboard allow us to infer its width at the joint with the body, which is consistent with a thirteen-course configuration. This wider neck was subsequently modified, a substantial amount of material of its sides shaved off to make it narrower in order to accommodate six courses. Crude tool marks and abrasions on the neck and the back of the instrument suggest this modification was carried out by someone inexperienced or with rather poor quality craftsmanship. Currently the join between the neck and the body is partially detached, the gaps and a square-shaped cavity in the neck are filled in with a sort of putty. There are nine frets tied to the neck, eight of nylon and one of natural gut.

The current pegbox is built for a six-course configuration<sup>309</sup> in which the first tuning peg is mounted on a *rider*. This is a typical feature of the kind of lute known as *mandora* or *galichon* which was popular in Germany and Italy from the second decade of the eighteenth century to the nineteenth century. The pegs are made of rosewood and appear to be from the same iteration as the pegbox, as is the bridge. The bridge is not original, it is made of ebonized wood with inlaid decorative elements of bone and has a number of fractures and traces of old repairs, its manufacturing style and decorative elements recall those of the German school of guitar making of the nineteenth century. All three sections – the pegbox, pegs, and bridge – share elements consistent with nineteenth century aesthetics and a somewhat crude and heavy manufacture.

The soundboard is made of two pieces of spruce of very narrow regular grain, radially-cut and bookmatch-joined. It is coated with a red varnish, and it

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<sup>309</sup> The first course is single and the rest are double.

presents numerous fractures running with the grain of the wood, some repaired and others still open, although none appear to be recent.

A significant section of the lower end of the soundboard presents an irregular fracture that resulted in the loss of original material. This was somewhat crudely repaired by replacing the missing sections of wood (*Figure 83*). Two more areas of the soundboard present replaced sections, one on the treble side in the vicinity of the edge, and another one on the upper area where the body meets the neck. All of these replacements were done with angular straight cuts and using pieces of wood that follow closely the grain pattern of the original soundboard.



*Figure 83.* Detail of the lower section of the soundboard. Photographed by Jonathan Santa Maria Bouquet, 2013.

The rosette is carved following a geometric motif very prevalent in lutes of this period, commonly known as Leonardo's knot.<sup>310</sup> It shows traces of earlier repairs and is missing several small segments (*Figure 84*).

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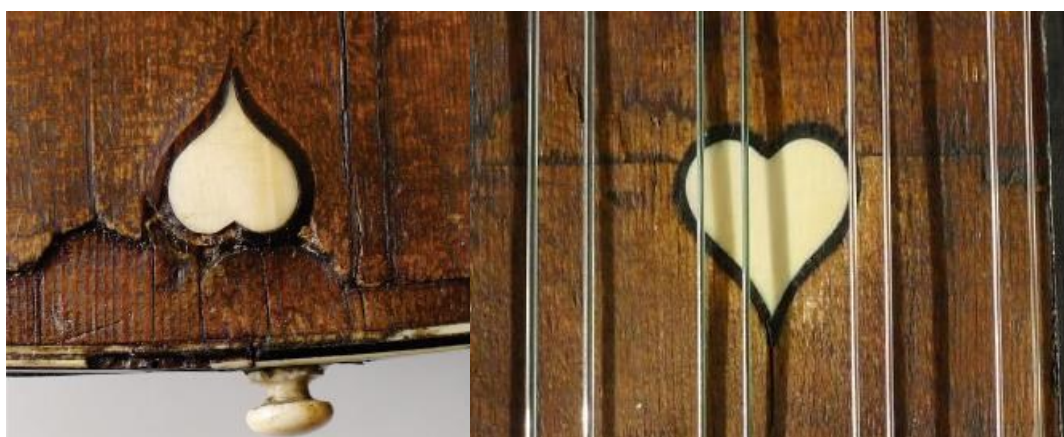
<sup>310</sup> See Page 83.





*Figure 84. Rosette of lute 1593. Photographed by Jonathan Santa Maria Bouquet, 2013.*

There are two heart-shaped ivory inlays in the soundboard, one at the bottom and one at the upper end between the fingerboard points, both contoured by dark wood (*Figure 85*).



*Figure 85. Soundboard decorative elements of lute 1593. Photographed by Jonathan Santa Maria Bouquet, 2013.*

The back is made of twenty-seven ribs of a highly figured red-coloured wood intercalate with ivory spacers. Under macroscopic examination this wood appears to be *guaiaac* or *Lignum Vitae*<sup>311</sup> (*Guaiacum Officinale*). The use of *guaiaac* for the construction of musical instruments is not exclusive to Rauwolf; in the Fugger inventory there are two entries which confirm its use: “5 I. A set of four lutes of *guaiaac* wood”, “26. Six cornetti of *guaiaac* wood in their case”.<sup>312</sup> Nonetheless, at the present time no other extant instrument made of this wood is known to exist.

The first shipment of *guaiaac* arrived in Spain in 1508 and the Fuggers, who were one of the main importers of a number of raw materials from the New World, brought it to Augsburg soon thereafter;<sup>313</sup> before the eruption of the Peasants’ War in 1524, their commercial empire was actively importing *guaiaac* wood from Santo Domingo to Augsburg.<sup>314</sup> Although widely used in ship-building at the time, *lignum vitae* was mainly imported as a medicinal product. It was thought to have unusual medicinal properties, and the treatment of choice to cure syphilis was to drink a concoction made from the resin of the tree.<sup>315</sup>

Syphilis, or the ‘French pox’, arrived in Europe most likely from the Americas and had become an epidemic by the mid-sixteenth century, which led to the Fuggers setting up a charitable institution known as *Holzhäus* “wood house”, providing treatment using extracts of *lignum vitae*.<sup>316</sup> Paracelsus strongly criticised the commercialization of *guaiaac* in the Fugger’s *Holzhäuser*, and in

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<sup>311</sup> *Lignum vitae* translates to English as “wood of life”.

<sup>312</sup> Smith, Appendix II, 320. Entries 51 and 26 of the inventory.

<sup>313</sup> Taylor, 24.

<sup>314</sup> Taylor, 1.

<sup>315</sup> Flood, John L. and David J. Shaw. 1992. “THE PRICE OF THE POX IN 1527 JOHANNES SINAPIUS AND THE GUAIAAC CURE”. *Bibliothèque D'humanisme Et Renaissance* 54 (3). Librairie Droz: 691–707.

<sup>316</sup> Häberlein, 82.



1529 he wrote that these “so-called hospitals are built for other ways for the sick to pay, just as if God gave a gift from Hispaniola, as if it were an indulgence sent from Rome.”<sup>317</sup>

The piece of guaiac employed by Rauwolf for the construction of the back of lute 1593 has a highly figured grain. The result is visually striking, unfortunately this particularly intricate grain made it quite unstable to changes of humidity and temperature, which has caused significant damage throughout time (*Figure 86*).



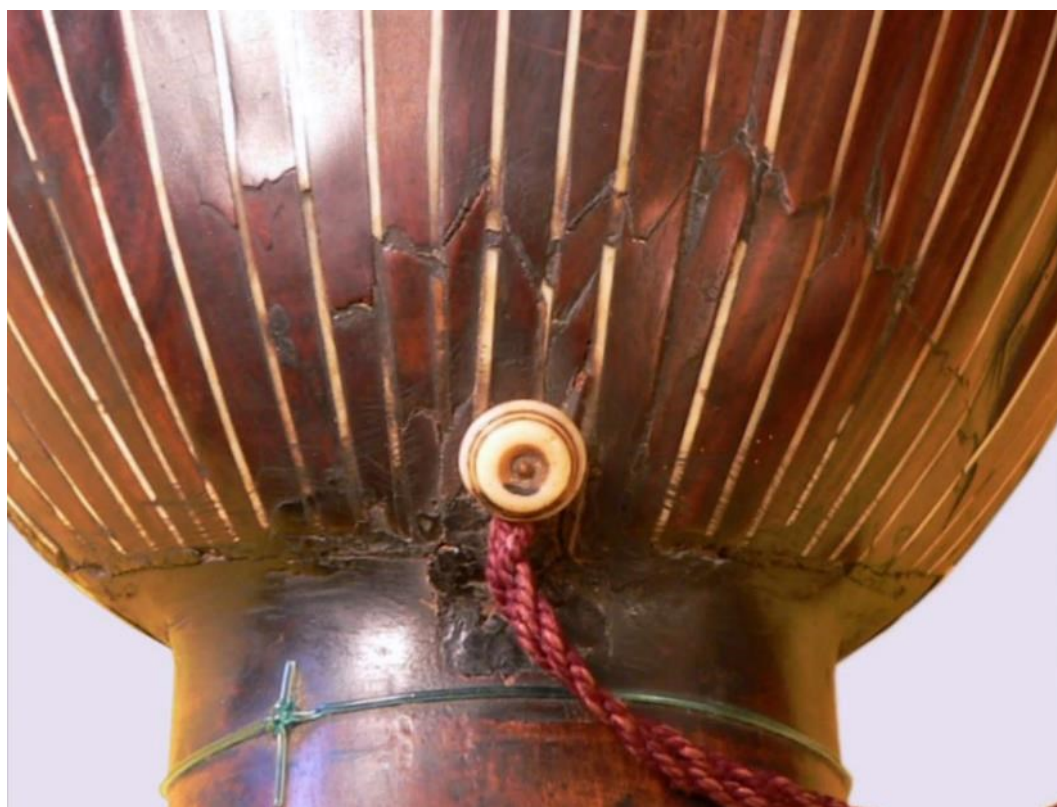
*Figure 86.* Close up of the back of lute 1593. Photographed by Jonathan Santa Maria Bouquet, 2013.

Currently the body of this lute is in a precarious state of conservation, all of its ribs have cracks, fractures, and missing fragments. Some of these cracks remain open and others have been repaired (almost certainly by different people in several repair jobs), either by gluing them back and reinforcing them from the

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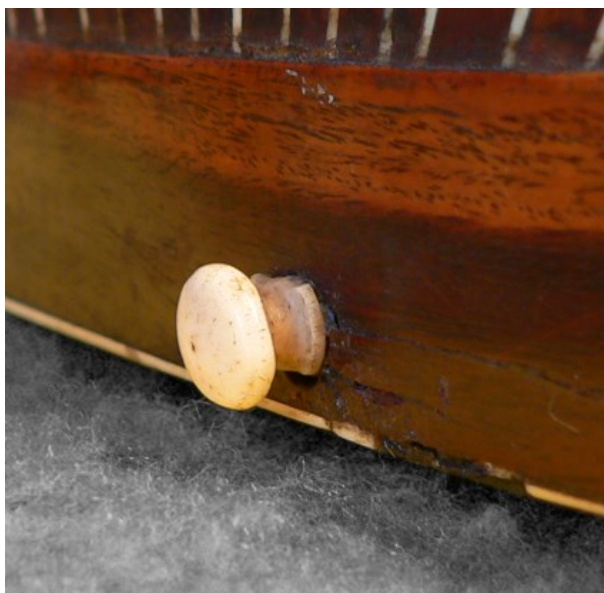
<sup>317</sup> Taylor, 60.

inside with wooden cleats or paper reinforcements, by replacing sections with wood insets, or filling the gaps with wood fillers. Most of the ribs are fractured across the grain in the vicinity of the line where the block ends; this damage was probably the result of a severe strain on the join between neck and soundboard (*Figure 87*). The last two ribs on the treble side seem to be replacements made of another wood species, (possibly *Tabebuia Guayacan*). The grain of the wood of these two ribs is more uniform and they are radially cut and as a result are significantly less damaged than the other ribs (*Figure 89*).

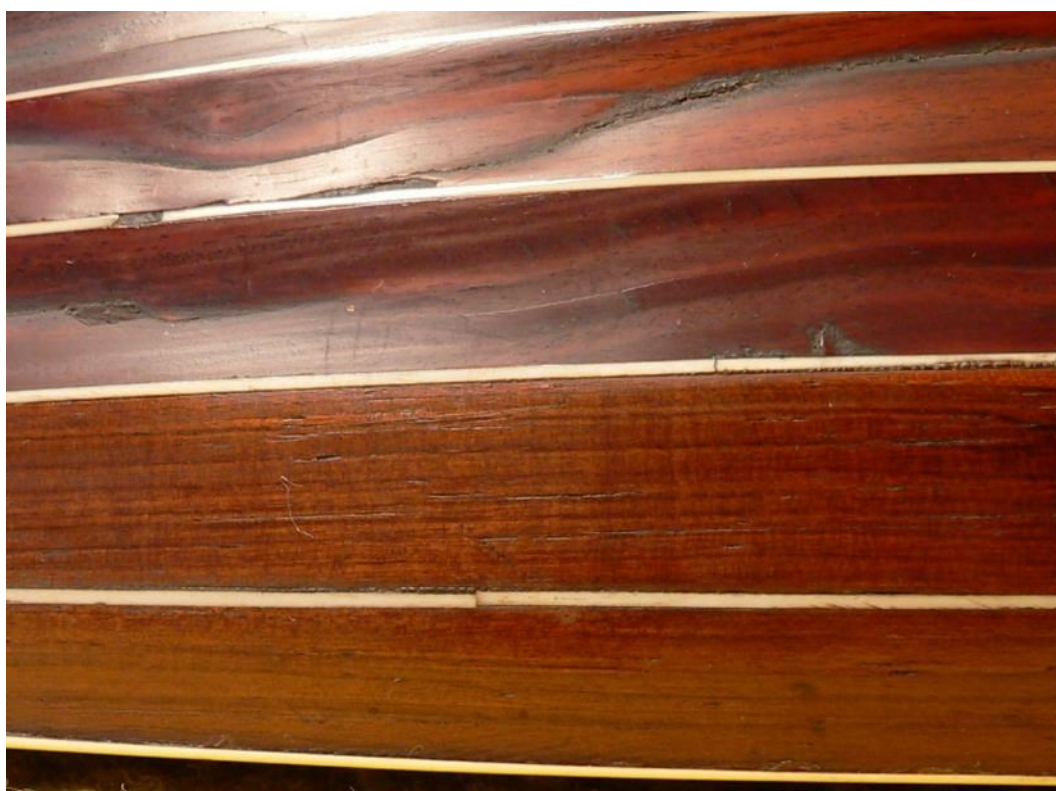


*Figure 87.* Detail of the upper section of the back. Photographed by Jonathan Santa Maria Bouquet, 2006.

There are two strap-buttons inserted in the back, one in the centre rib near the joint with the neck (*Figure 87*) and one in the middle of the clasp (*Figure 88*).



*Figure 88.* Strap-button inserted in the clasp of lute 1596.



*Figure 89.* Detail of the last two ribs on the treble side. Photographed by Jonathan Santa Maria Bouquet, 2006.

The clasp is made of the same wood as the ribs, however, the piece of wood used for its construction shows both sapwood and heartwood (*Figure 88*). The outline of the clasp (excluding the side glued to the soundboard) is surrounded



by an ivory binding of the same width as the spacers between ribs. Currently several sections of this binding are missing.

The decorative ends of the clasp are partially missing, probably as a result of repair works carried out at some point (*Figure 90*). This was a fairly common procedure known as re-setting of the soundboard: due to the increased tension associated with the considerably larger number of strings, the neck would move and twist, resulting in a very high string *action*.<sup>318</sup> To correct this, the soundboard was unglued from the body<sup>319</sup> and the outer ribs were planed down, thus modifying the angle between body and neck and lowering the string action. The removal of material from the ribs would result in the partial loss of these points.



*Figure 90.* Detail of the decorative end of the clasp. Photographed by Jonathan Santa Maria Bouquet, 2013.

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<sup>318</sup> The string action is the distance between the strings and the soundboard and between the strings and the fingerboard, to allow the instrument to be played in a comfortable manner without the strings buzzing against the fingerboard and frets.

<sup>319</sup> This can be achieved without removing the soundboard entirely; the lower end can be opened partially leaving the upper section still attached to the block and neck.

1596, Metropolitan Museum of Art, New York (MMA 89.2.157)



*Figure 91. Lute 1596. Photographed by Jonathan Santa Maria Bouquet, 2006.*

This instrument came to the collection of the Metropolitan Museum of Art as part of a donation made by Joseph W. Drexel in 1889.

Drexel came from a wealthy family of bankers, he himself was “a banker and partner of J.P. Morgan, who in 1876 retired from business to devote himself to

charity”<sup>320</sup> and became a philanthropist and a music aficionado. According to Rebecca Lindsey:

Drexel showed his interest in music by collecting musical manuscripts, serving as director of the Metropolitan Opera, president of the New York Philharmonic Society (the predecessor to the New York Philharmonic), playing several instruments – most notably the violin – and, in 1884, making a collection of musical instruments.<sup>321</sup>

As a trustee of the Metropolitan Museum of Art,<sup>322</sup> Drexel offered his collection of forty-four musical instruments to the museum in 1885, including the 1596 lute by Rauwolf, under the agreement that he would design the layout and the display of the objects in the gallery himself. The Museum's Committee on Art Objects recommended acceptance of Drexel's offer, and he became the founder of the musical instrument collection of the Metropolitan Museum of Art, which opened to the public on November 2, 1885.

The legal ownership of these instruments from 1885 to Drexel's death in 1888 is uncertain, as the instruments were registered as loans and not as gifts as Drexel's correspondence with the museum seems to indicate.<sup>323</sup> Upon Drexel's death, his wife Lucy Drexel finalized the paperwork to make official the bequeathing of all the instruments to the Metropolitan Museum of Art, and they were accessioned in 1889.

No information is currently available about the provenance of this lute before 1885, although it is conceivable that it was acquired by Drexel before 1884 when

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<sup>320</sup> <https://metmuseum.atavist.com/musicalinstrumentshistory#chapter-146444> consulted on 02/03/2016.

<sup>321</sup> Rebecca Lindsey, “Joseph W. Drexel and the Beginnings of the Met's Musical Instrument Collection” January 30, 2014 <http://www.metmuseum.org/blogs/of-note/2014/joseph-drexel>, consulted on 01/03/2016.

<sup>322</sup> Drexel was elected a Museum trustee in 1881.

<sup>323</sup> Email communication with the Curator of the Musical Instrument Collection of the Metropolitan Museum of Art, Jayson Dobney on 02/03/2016.

he spent time in Paris “forming a collection of old musical instruments”.<sup>324</sup> However, the clear signs of modifications, replacements, and alterations provide evidence to trace a plausible account to this instrument’s history.

### Description of the instrument

It was made in Augsburg in 1596, most likely as an eight-course instrument. Inside the body there is a handwritten label glued to the back of the instrument (Figure 92), which reads:

*Sixtus Rauchwolff/ Augustanus. A<sup>o</sup> 1596/ manum propa.*<sup>325</sup>



Figure 92. Composite image of labels inside the instrument.

As it is the case with all the extant lutes by Rauwolf, this lute was modified several times through its working life. The neck is an important source of

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<sup>324</sup> Excerpt from a letter from Drexel to Luigi Palma di Cesnola (Director of The Metropolitan Museum of Art, 1879–1904) December 17, 1884, referenced in:

<https://metmuseum.atavist.com/musicalinstrumentshistory#chapter-146444> consulted on 02/03/2016.

<sup>325</sup> *Augusta* is the Latin name for Augsburg.



information in this regard as it provides physical evidence of the iterations it went through due to the different trends and ever changing tastes in music.

The first evidence of a modification is a second label glued to the back inside the instrument (*Figure 93*) which reads:

MATTHIAS HUMMEL/ LAUTEN=UND GEI/GENMACHER IN  
NÜRNBERG/ Anno 1694/ ZUGERICHT.

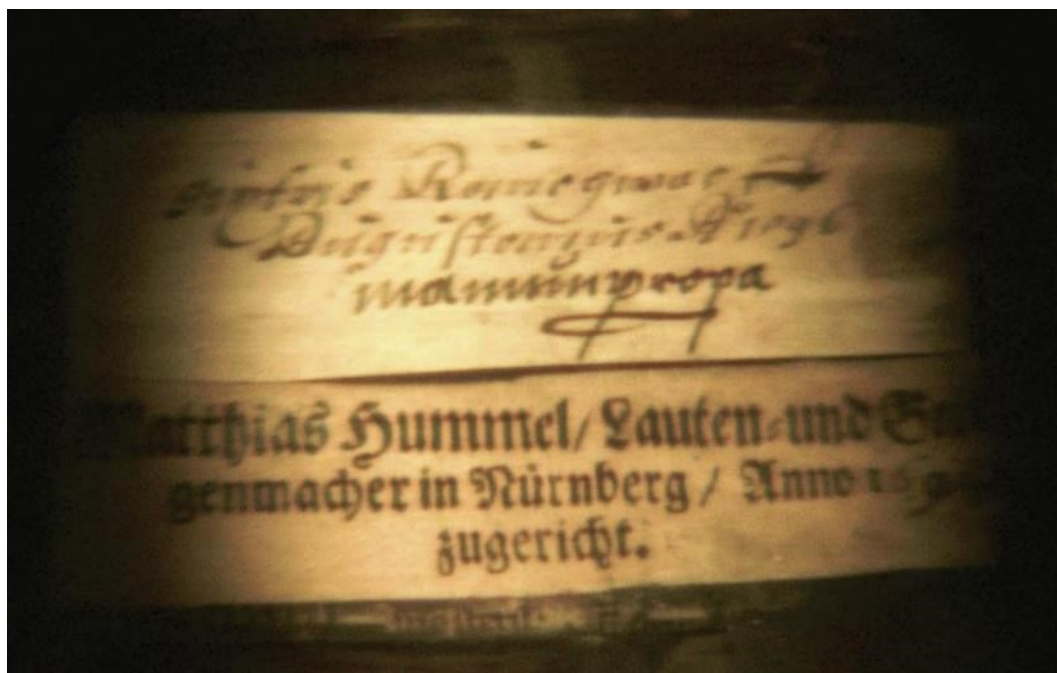


Figure 93. Endoscopic image of the labels. Photographed by Jonathan Santa Maria Bouquet, 2006.

Hummel was a lute and violin maker from Augsburg, he learned the trade from his father who was based in Augsburg from 1634 to 1658, and then moved to Nuremberg where he established his shop from 1678.<sup>326</sup>

Most likely this modification by Hummel involved replacing the original neck with a wider one to accommodate a larger number of courses, as was customary at the time. Judging by the date in the label this neck was most likely

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<sup>326</sup> John Henry Van Der Meer. "Review: Leopold Widhalm und der Nürnberger Lauten- und Geigenbau im 18. Jahrhundert by Klaus Martius" *The Galpin Society Journal* 50 (1997), 265.

meant for an eleven-, rather than a thirteen-course configuration. The eleven-course lute was particularly popular in France and in the Germanic countries for about eighty years, from the second half of the seventeenth century to around 1720.<sup>327</sup> The current pegbox might date from this particular modification, although it has since been altered.

Similarly to lute 1593, the replaced wider neck was modified further by removing material on its sides to reduce its width and accommodate six or seven courses. This sort of alteration was fairly common, particularly in Germany during the first half of the eighteenth century, and was meant to convert an old lute into a mandora. Most likely during this modification, the eleven-course pegbox was removed, shortened, and reattached to the neck, which would explain why the first three peg-holes from its joint with the neck are plugged and therefore annulled (*Figure 94*). The pegbox as it stands today has sixteen peg-holes, which would accommodate eight double courses. Nonetheless, since only the first half of the first peg-hole is present, and its diameter on the treble side is larger than on the bass side, most likely there was at least one additional peg-hole,<sup>328</sup> plus the necessary space between the joint and the first hole for the lower block of the pegbox. Therefore, this pegbox was likely built to hold at least nine courses.

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<sup>327</sup> Mariagrazia Carlone, and Paul Beier. "Lutes, Archlutes, Theorboes in Iconography." *Music in Art* 30, no. 1/2 (2005), 78. <http://www.jstor.org/stable/41818775>.

<sup>328</sup> The first peg in the pegbox is always oriented in such way as to have its head on the bass side, thus providing more room for the hand of the player when playing in the first frets.



Figure 94. Plugged peg-holes in the pegbox and indentations created by gut-frets in the neck. Photographed by Jonathan Santa Maria Bouquet, 2006.

The back of the current neck has indentations caused by gut frets, indicating that the eight ivory frets on the fingerboard were added in a yet subsequent iteration, probably during the nineteenth century when many lutes were converted into guitars (Figure 94). The current bridge was probably part of this conversion; it mounts six single strings (like a guitar) and has an interesting yet atypical decoration on its ends (Figure 95).



Figure 95. Detail of the bridge. Photographed by Jonathan Santa Maria Bouquet, 2006.

The soundboard is made of two pieces of spruce of very narrow regular grain, radially-cut and bookmatched. The finely-carved rosette has a geometric motif of a six-point star typical of the period (Figure 96). Although the soundboard

shows traces of repairs, it is in an excellent state of conservation. A dendrochronological analysis undertaken by Peter Klein in June 1999 establishes that based in the "...evaluation with different spruce chronologies it was evident that the tree grew in the alpine region... the growth rings of the treble side can be dated between 1546 and 1386, those of the bass side between the years 1572 and 1385", <sup>329</sup> therefore the year 1572 must be considered as *terminus post quem*. Dr Klein concludes that the "...creation of the belly is possible from 1573 upwards". As confirmed by the date on the label inside this lute, 1573 is a rather unlikely date for the construction of the soundboard; a drying period of at least five years, plus the removal of a number of growth rings whilst processing the wood and making the soundboard must be taken in account.

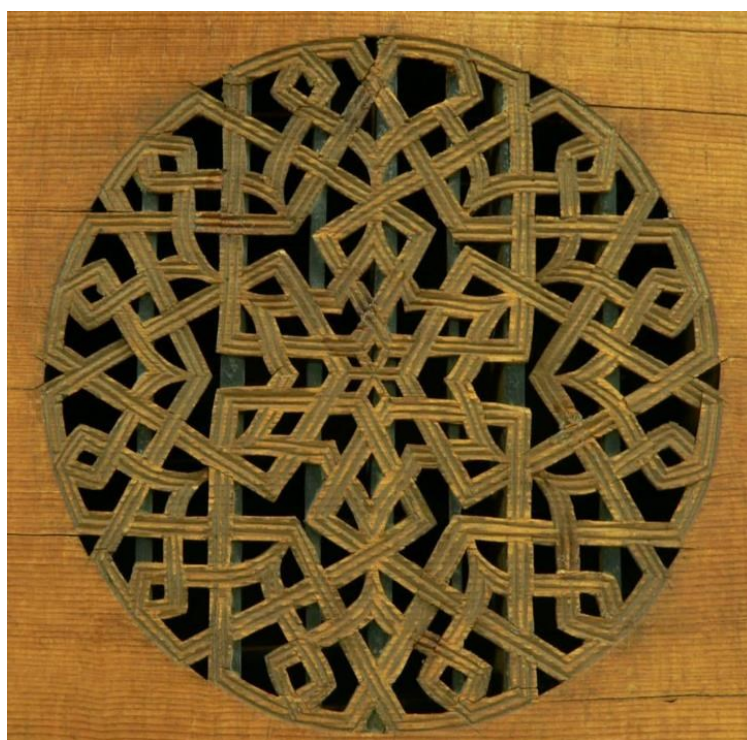


Figure 96. Rosette of lute 1596. Photographed by Jonathan Santa Maria Bouquet, 2006.

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<sup>329</sup> Dr. Peter Klein, "Dendrochronological analysis of a lute (Sixtus Rauchwolf, label 1596, Inv.-No.89.2.157)" Universität Hamburg, Ordinariat für Holzbiologie, Hamburg June 28, 1999.



There are two decorative inlays on the soundboard near the central joint, one at the bottom end, heart-shaped made of mother of pearl and surrounded by dark wood, with a triangle underneath, also surrounded by wood although the inlaid piece, which was also probably mother of pearl, is missing. On the upper section of the soundboard, between the fingerboard points, there is another inlay in the shape of a heart made of ebony; very likely this inlay was originally made like the one at the bottom (previously described) made of mother of pearl surrounded by ebony, similarly to the inlay present in lute 1593, in which the inlay is an ivory heart with an ebony contour.



*Figure 97.* Soundboard decorative inlays of lute 1596. Photographed by Jonathan Santa Maria Bouquet, 2006.

X-ray photography shows the layout of the internal bracing which could be original (*Figure 98*). Endoscopic images of the braces show the material employed in their construction, the orientation of the grain parallel to the soundboards, and their shape are consistent with those found in other late-Renaissance lutes (*Figure 99*).

All the braces under the bridge are missing and have been replaced by a wide bridge-reinforcement, similar to those used in guitar making. Along the joint between the soundboard and the outer ribs there are a number of small wooden blocks reinforcing the joint and supporting the braces, and the counter-cap has been replaced with a solid trapezoidal wooden block (*Figure 98*).

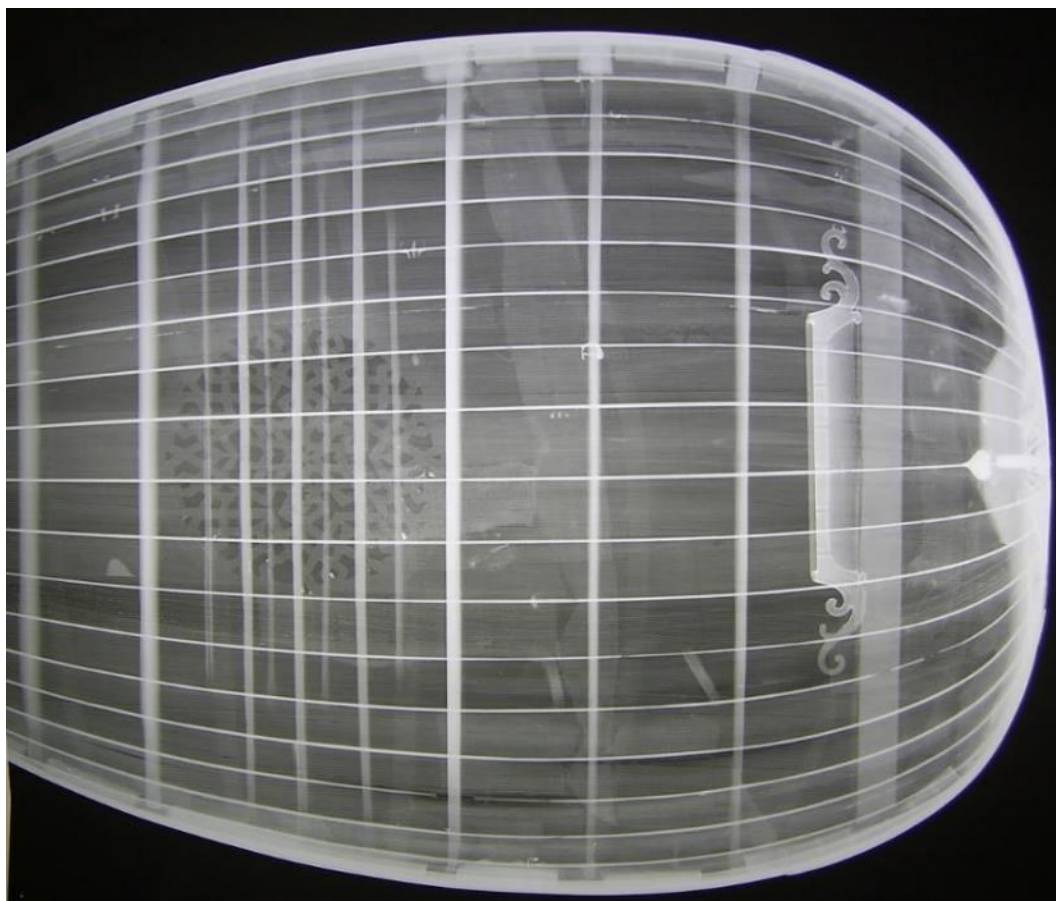


Figure 98. X-ray of the body of Lute 1596. Jonathan Santa Maria Bouquet, 2008.

The back is made of twenty-five ribs of dark wood, probably ebony, with ivory spacers. Endoscopic imaging shows paper reinforcements running along the joints between the ribs, as well as across the back from side to side. The presence of text in the paper used for these reinforcements suggests it was reused, probably from a book (Figure 99). Although the text is truncated it appears to be Latin, written in a font that could be consistent with the period in which the lute was made. The capital letters are written in red ink and they appear clearly in the X-ray imaging, suggesting the ink used was *red lead*. This pigment was widely used for manuscripts during the Renaissance, and as its name suggests it was made of lead oxide. Lead is extremely dense, so Xx-radiation does not penetrate it as well as it does wood, therefore it appears quite bright in radiography (Figure 100).



*Figure 99.* Endoscopic image of the braces and the paper reinforcements in the back. Photographed by Jonathan Santa Maria Bouquet, 2006.



*Figure 100.* Highlighted capital letters in the paper reinforcements as shown in the X-ray imaging due to the presence of red lead pigment.



There are two strap-buttons inserted in the back, one in the centre rib near the joint with the neck and one in the middle of the clasp (*Figure 101*).



*Figure 101.* Strap-buttons inserted in lute 1596.

The clasp is made of the same wood as the back and is enclosed by an ivory binding, similar to lute 1593. Its decorative ends or points are characteristic of Rauwolf and they are exceptionally well-preserved (*Figure 102*). On most of Rauwolf's extant lutes, the points are partially lost due to repair works or modifications.



*Figure 102.* Detail of the decorative end of the clasp (treble side) of lute 1596. Photographed by Jonathan Santa Maria Bouquet, 2006.

The widths of the two outer ribs of this instrument are significantly dissimilar, which could be at least partially the result of a re-setting repair. Nonetheless, the completeness of the decorative ends of the clasp conflicts with this conclusion, as such repairs often result in their partial loss. A more plausible explanation is merely a construction flaw, probably the result of the use of a round mould, rather than a faceted one, and the accumulation of small inaccuracies in the width of multiple ribs which becomes more evident in the last rib.

There is a decorative ivory lace glued to the last rib on the treble side of the back along the full length of the joint with the soundboard from the end of the clasp to the joint with the neck (*Figure 103*). This was probably added to rest the instrument on a table to make playing more comfortable. Indeed, this practice can be seen in the musical iconography of the period (*Figure 104*) and many lutes today have a similar binding on the treble side. A reference to this can be found in Thomas Mace's *Musick's Monument*:

And then keep your lute stiff, and strongly set with its lower edge against the table-edge, and so (leaning your breast something hard against its ribs) cause it to stand steady and strong, so, that a by-stander, cannot easily draw it from your breast, table and arm.<sup>330</sup>

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<sup>330</sup> Thomas Mace, *Musick's Monument; OR, A REMEMBRANCER Of the Best Practical Musick, Both DIVINE, and CIVIL, that has ever been known, to have been in the World. Divided into Three Parts. The First PART, Shews a Necessity of Singing Psalms Well, in Parochial Churches, or not to Sing at all; ... The Second PART, Treats of the Noble Lute, (the Best of Instruments) now made Easie; ... In the Third PART, The Generous Viol, in Its Rightest Use, is Treated upon; with some Curious Observations, never before Handled, concerning It, and Musick in General*, (London, 1709), 71.



Figure 103. Lute 1596, side view. Photographed by Jonathan Santa Maria Bouquet, 2006.



Figure 104. Lute Player. Theodor Rombouts, c. 1620. Oil on canvas. Philadelphia Museum of Art (PMA. Cat. 679).





Figure 105. Lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

This instrument was part of the musical instrument collection of the Danish financier, textile manufacturer, diplomat, philanthropist, and instrument collector, Carl August Jensen Claudius.<sup>331</sup> Claudius started collecting instruments around the 1880s, and according to Madeleine Modin “Lutes were

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<sup>331</sup> "Claudius, Carl August Jensen." *Grove Music Online*. Oxford Music Online. Oxford University Press, accessed November 24, 2016, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/L2232365>.



his major interest, but he strived at a complete collection of European high culture instrumentarium".<sup>332</sup>

Claudius pledged his collection of musical instruments to become the foundation for the establishment of the new Musikhistorisk Museum in 1898. This lute was not part of the initial donation, though, it was a part of Claudius' personal collection which was recorded in a posthumous catalogue published in 1931 (*Figure 106*),<sup>333</sup> and wasn't merged into the Copenhagen museum's collection until the 1970s.<sup>334</sup>

In recent years the museum was moved to a new building, reopening its doors to the public in 2014, re-branded as Musikmuseet or the Danish Music Museum, as part of the Nationalmuseet or the National Museum of Denmark.

Claudius did not provide any information on the provenance of any of his instruments, neither in his records, nor in the material donated or sold to the Stockholm and Copenhagen music museums,<sup>335</sup> and therefore it is virtually impossible to trace the provenance of this instrument previous to the Claudius collection.

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<sup>332</sup> Email correspondence with Madeleine Modin on the 24th of November 2016.

<sup>333</sup> Carl Claudius, *Carl Claudius' Samling Af Gamle Musikinstrumenter* (Copenhagen: Levin & Munksgaards, 1931), 97, 100, 102.

<sup>334</sup> Email correspondence with Madeleine Modin on the 24th of November 2016.

<sup>335</sup> Madeleine Modin. "Carl Claudius and his sound-chests". *Through the Eyes and Ears of Musical Instrument Collectors (1850–1950)*, ed. Christina Linsenmeyer. (Oxford: Routledge, 2018). Forthcoming book.



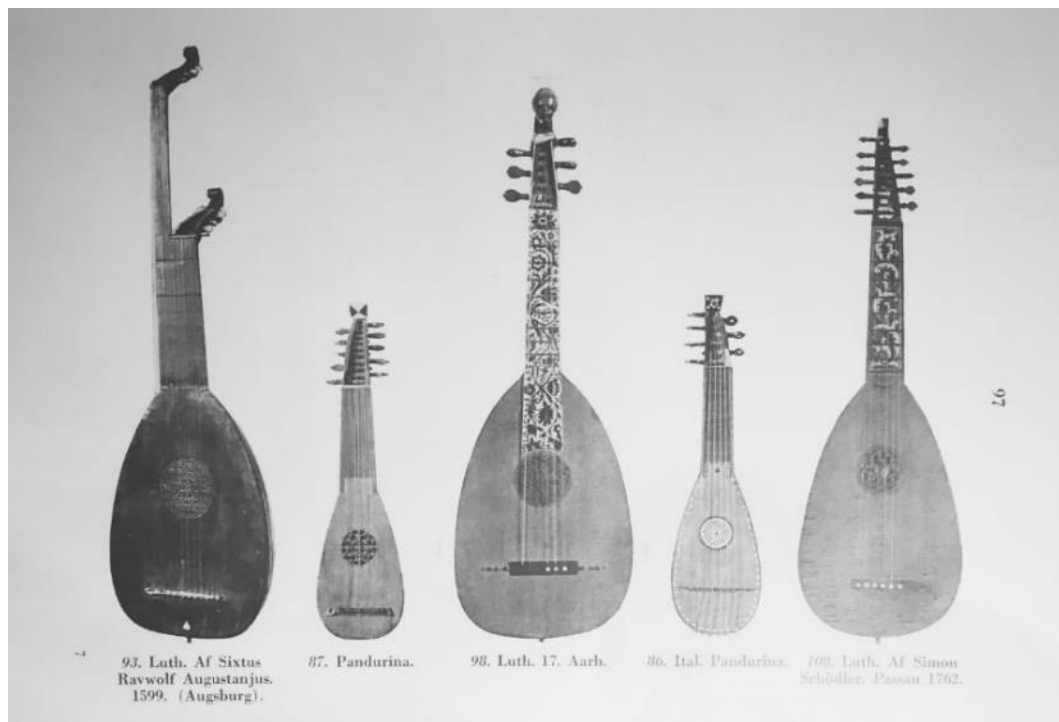


Figure 106. Carl Claudius catalogue.

This instrument is the only known extant example of a particular kind of lute with a straight neck extension and two bent-back pegboxes. As lower bass strings were added to the lute to extend their compass, a common problem arose. Lute strings were made with gut, and to achieve a lower pitch with a relatively short string length they had to be very thick, producing a rather dull sound poor in harmonics. As a solution to this problem, lutenists and lute makers tried to find ways to lengthen the lower strings, allowing for longer thinner strings and hence producing a better sound.<sup>336</sup> The quest to create instruments that would allow for longer bass strings spawned numerous inventions and experiments. This kind of lute, in which the fingerboard and the neck under the bass strings is extended and ends in a second pegbox, appears

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<sup>336</sup> Carlone and Beyer, 78.

to be popular around the first couple of decades of the seventeenth century when we find it portrayed in numerous iconographic sources.



Figure 107. *Young man with a lute* (*Joven tocando la tiorba* is the official name in Spanish), Jan Gerrit van Bronckhorst c1625, oil on canvas. Museo Thyssen-Bornemisza, Madrid (73 (1981.70)).



Figure 108. *The Duet*, Jan Miense Molenaer c1630, oil on canvas. Seattle Museum of Art, Samuel H. Kress Collection, 61.162.

## Description of the instrument

A label inside the instrument reads:

Sixtus Rauwolf / Augustanus 1598 / manum propa.

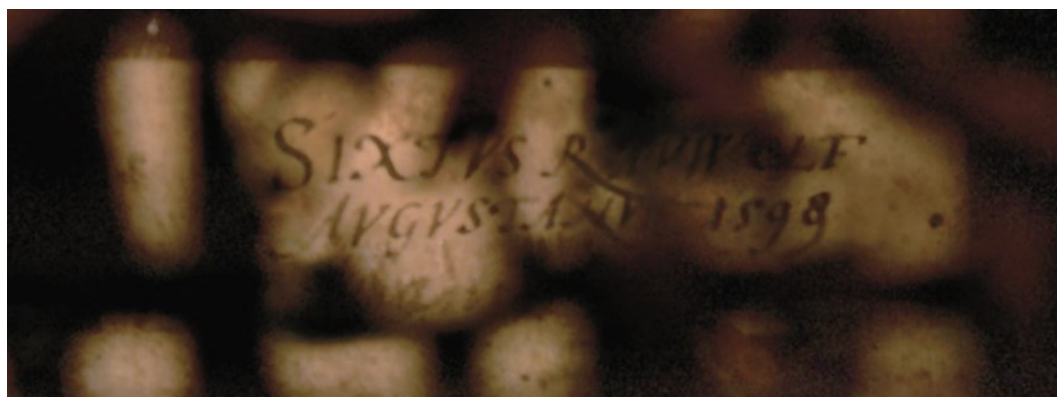


Figure 109. Composite image of the label of lute 1598.

Slightly larger than lutes 1593 and 1596, this instrument was in all probability conceived originally as a tenor rather than an alto lute.<sup>337</sup> Its original neck, most likely for eight or nine courses, was replaced around the first half of the seventeenth century with the previously described double neck intended for a ten-course configuration, all of them double but with the first six attached to a somewhat normal bent-back pegbox and the lower four attached to a second pegbox.

The neck is made of a core of wood veneered with stripes of a hardwood (angiosperm) with long ivory spacers continuing along the bass extension, and it is coated in a reddish coloured varnish. The body-neck joint is partially detached and there are clear tool marks in the back of the instrument, probably remnants of the neck replacement (*Figure 110*).

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<sup>337</sup> Its original string length can be established as ca 675mm which according to Rizzi (*Liuteria*: 14), is consistent with the range for a tenor lute tuned in E.





*Figure 110.* Detail of neck joint of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

The materials and craftsmanship employed for the manufacture of the peg boxes is noticeably different from that of the neck, from which it can be deduced that they are the result of a later repair. Both are veneered with wood with inlaid spacers simulating those on the back of the neck, but made of wood (*Figure 111*). The tuning pegs are made of bone, with the exception of the peg for the first string, which is made of pear wood.



*Figure 111.* Detail of pegboxes of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

The soundboard is made of two pieces of spruce of very narrow regular grain, radially-cut and bookmatched. Only one of the inlaid heart-shaped decorative elements typical of this maker is present near the bottom end of the soundboard (*Figure 112*); there are usually no traces of the second one between the decorative ends of the fingerboard.



*Figure 112.* Detail of the decorative inlays of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

There are numerous fractures on the soundboard, some of them repaired whilst others remain open, although none seem to be recent. There is evidence of woodworm damage on different areas of the soundboard, some of the insect galleries have been filled in with a yellowish paste and others have been left open and eventually have become dark with dust and dirt. Numerous scratch marks are present on the surface of the soundboard. These marks are not consistent with playing wear sometimes found in plucked string instruments, since contrary to the uniform diagonally infringed marks left by the players' nails whilst strumming, the marks on this instrument go in different directions grouped in specific areas of the soundboard and worsening towards the edges; instead, they appear to be a remnant of roughly sanding the surface (*Figure 113*).



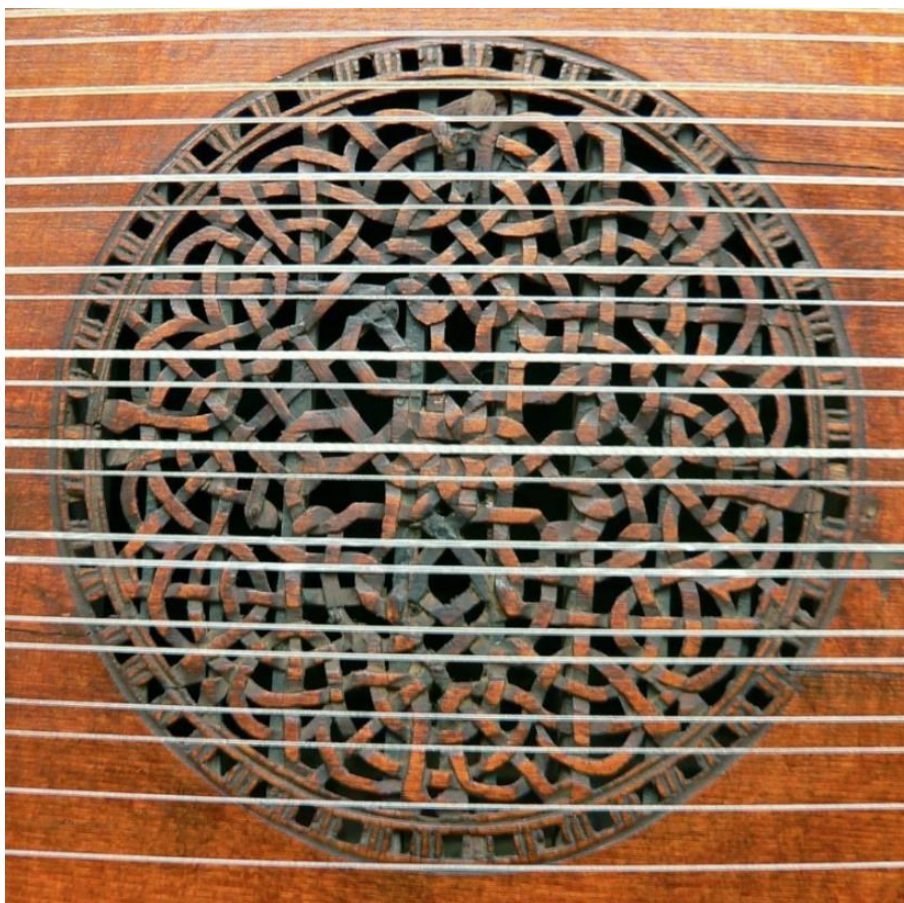


*Figure 113.* Detail of soundboard repairs and scratches of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

The rosette is carved in the soundboard, and presents a similar geometric pattern as that on lute 1593; in this case, the pattern continues further in the same design,<sup>338</sup> and it ends with the addition of a decorative contour. There are traces of previous repairs to the rosette and some sections are currently missing. A distinctive characteristic of this particular rosette is the absence of the decorative grooves within the pattern (*Figure 114*).

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<sup>338</sup> As previously discussed, often the same pattern was used to carve rosettes of different diameter, cutting the pattern shorter to match the desired size.



*Figure 114.* Detail of the rosette of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

The bridge holds ten double courses, is most likely part of the same iteration as the neck, and is fixed to the soundboard with four screws which have caused severe cracks to both the bridge and the soundboard. There are clear traces of a previous bridge glued about 5 mm lower in the soundboard (*Figure 115*).



*Figure 115.* Detail of the bridge of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

The back is constructed of twenty-five ribs of yew (*Taxus baccata*)<sup>339</sup> with ivory spacers, and coated with a thick red varnish (Figure 116). It has multiple fractures along the grain, most of them repaired; deep scratches similar to those of the soundboard are present in some of the ribs, and some ribs have replaced sections.



Figure 116. Back of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.

The clasp is made of the same wood as the ribs and it has a scored line running parallel along its contour approximately two millimetres from the edge instead of the ivory binding present in lutes 1593 and 1596. Rauwolf's mark is imprinted with a branding iron, although it was subsequently damaged when a hole was drilled in the same place to add a strap-button. The decorative ends of the clasp are characteristic of Rauwolf, and although the two outer ribs of the

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<sup>339</sup> Contrary to the more common practice of cutting the yew slabs in a particular way to have both heartwood and sapwood on each rib, on this lute only the heartwood is present.



back, as in the previous examples, have been considerably reduced due to repair works, the points are relatively complete (*Figure 118*).

There is a strap-button inserted into the centre rib near the joint with the neck (*Figure 117*).



*Figure 117.* Rauwolf's mark, branded in the clasp and obliterated by former strap-button (left), and strap-button on lute 1598 (right). Photographed by Jonathan Santa Maria Bouquet, 2006.



*Figure 118.* Detail of decorative end of the clasp of lute 1598. Photographed by Jonathan Santa Maria Bouquet, 2006.



Figure 119. Lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.

Currently this lute is part of the collection of the Scenkonstmuseet, the Swedish Museum of Performing Arts in Stockholm. According to the museum's archive this lute was purchased from a private collector J. Jansson in Sweden, and brought into the collection in 1933 by the director of the museum at the time, Tobias Norlind.<sup>340</sup> Because of a repair label glued inside the back, this lute was

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<sup>340</sup> Email exchange with Eva Olandersson, Curator of Music, Scenkonstmuseet, Musikverket, Stockholm, 2017.

registered as made by J. Ch. Hoffman, until researcher Klaus Martius identified it as a Rauwolf instrument.

The museum has gone through multiple transformations, first founded in 1898 as Musikhistoriska museet, it became a state museum 1981 and changed its name to Musikmuseet. In 2010-11 Musikmuseet became a museum for music, theatre and dance with the addition of the collections from Sveriges teatermuseum and Marionettmuseet, changing its name again to Musik- och teatermuseum. It was closed down in 2014 for a large redevelopment project, and reopened its doors in 2017 under the name Scenkonstmuseet – Swedish Museum of Performing Arts.

### Description of the instrument

According to a label glued to the inner side of the back (now partially missing), this lute was constructed in 1612 and therefore is the latest known instrument by Sixtus Rauwolf. Because of the repertoire for lute and the music trends of the first decades of 1600, it is plausible that it was originally conceived as a nine- or ten-course lute, and it has been extensively modified in the course of its existence.

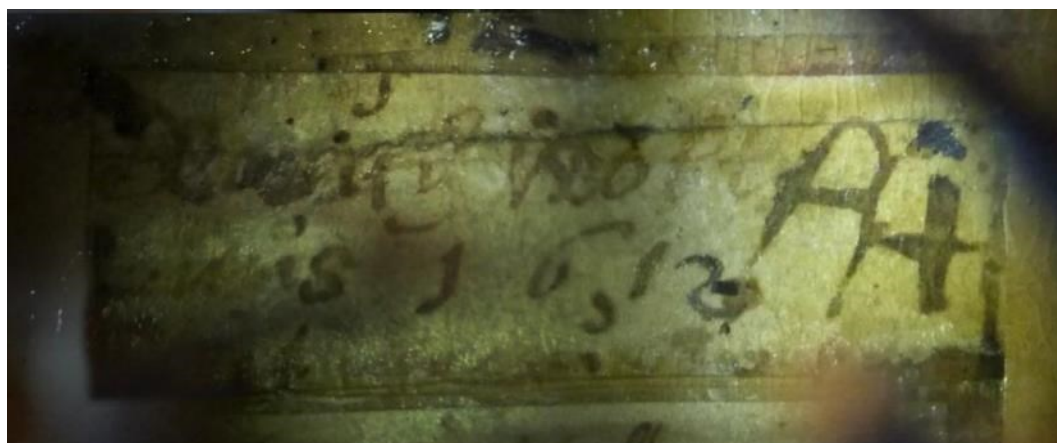
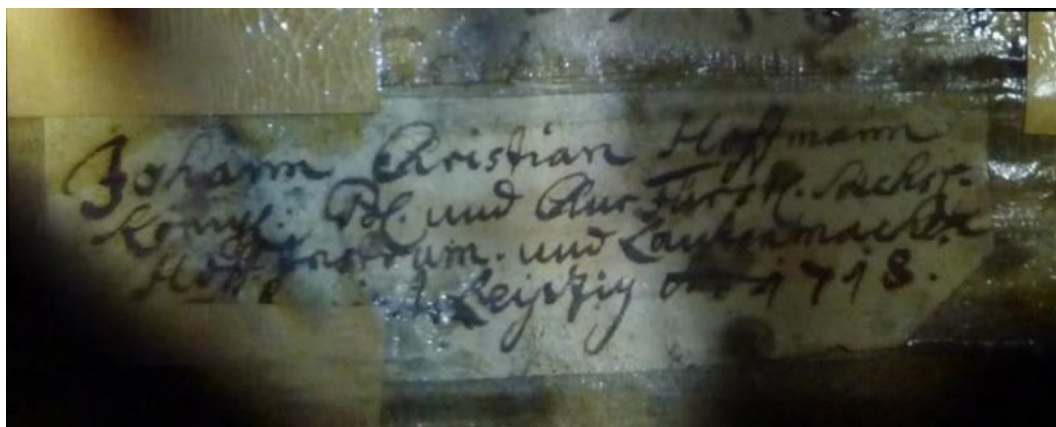


Figure 120. Maker's label inside Lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.



Evidence of at least one of these modifications, which took place slightly more than a hundred years after its construction, is a printed repair label glued to the inside of the back (*Figure 121*). This label reads:

Johann Christian Hoffmann/ Königl. Pol. und Chur Fürstl. Sächs./ Hoff  
Instrum. und Lautenmacher/ [...] Leipzig Ao 1718.



*Figure 121.* Repair label inside lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.

Johann Christian Hoffmann was a renowned instrument maker active in Leipzig, Germany during the first half of the eighteenth century. He was not only a very skilled lute maker, but he was also known for his expertise in modernizing old lutes by adding the previously described thirteen-course swan-neck extensions<sup>341</sup> to meet the demands of the musicians of the early eighteenth century.

In a letter written by J. C. Hoffmann to one of his customers, Johann Friedrich Armand von Hoffman Uffenvach on 10th April 1740, he states:

Since you, dear sir, is a connoisseur of ancient bodies of lutes, I am sending you two drawings of this type of body. The smaller by Sixtus Rauchwolff with narrow ribs as seen commonly in old lutes, the neck is made according to the current trend, veneered with ebony. My work on this instrument includes the extended pegbox along the lines of Mr.

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<sup>341</sup> Description of lute 1577, page 135.

Weiss, cleaning and mounting of the strings and frets, the sound box has a remarkable sound and finish ... Anyone who wants should see and try out this instrument to confirm if I did it correctly.<sup>342</sup>

It has been suggested by Klaus Martius that Rauwolf's 1612 lute could be the one discussed in the letter.<sup>343</sup> However, the date on the repair label is 1718 and the letter is dated 1740, therefore, if Hoffmann is indeed talking about the same instrument it means he still had it after twenty-two years, which is rather unlikely. Also the description as "small" is unsuitable to describe the size of the body of this lute. A more plausible explanation is that Hoffmann worked on more than one lute made by Rauwolf, and the instrument described in the letter is not the 1612 lute.

About a hundred years later, probably in the 1820s, this lute went through another major transformation, this time to turn it into a sort of guitar. Like lutes 1593 and 1596, the wider thirteen-course neck width was narrowed by shaving a considerable amount of wood from its sides; the back of the present 'guitar' neck has a continuous ebony strip in the centre, which is most likely a remnant of the neck replaced by Hoffmann in 1718 (*Figure 122*). As part of this transformation the swan-neck pegbox was removed and replaced by a rather unattractive eight-shaped guitar peghead; the bridge was replaced to fit six single strings and was glued on a different position higher up in the soundboard, leaving clear traces of the thirteen-courses bridge on the soundboard (*Figure 123*); and ivory frets were inlaid into the fingerboard.<sup>344</sup>

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<sup>342</sup> Uffenbach-Archiv Göttingen [de re musicae, fol 638f].

The text is translated in: ANDRE BURGUETE, *The recovery of Silvius Leopold Weiss's theorbo. Theatrum Instrumentorum Dresdense, Bericht ueber die Tagungen zu Historischen Musickinstrumenten Dresden 1996 und 1999*, ed. Wolfram Steude und Hans Gunter Ottenberg (Schneeverdingen: Karl Dieter Wagner, 2003), pp.65-88.

<sup>343</sup> Description of the instrument by Klaus Martius, on file at the Stockholm Musikmuseet provided by Dan Johansson, April 2014.

<sup>344</sup> Currently the seventh fret is missing.



*Figure 122.* Detail of the neck and body joint of lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.



*Figure 123.* Traces of the thirteen-course bridge on the soundboard. Photographed by Jonathan Santa Maria Bouquet, 2014.

The soundboard is quite different from those of the other extant instruments by Rauwolf. Although it is formed of two pieces of spruce jointed at the middle, the two pieces do not appear to be bookmatched, the material used for its construction is of lower quality, the space between growth rings wider and less uniform, and there are no traces of the heart-shaped inlaid decorations, or the

binding, which are characteristic of Rauwolf's work. Dendrochronological analysis by Dr Katarina Cufar confirms these reservations. In her report Dr Cufar "could not confirm that the bass and treble boards originate from the same stem. However, they most likely originate from the same site".<sup>345</sup> In addition the report determines that "The end date on the board of the bass side is 1664. This could be due to wood processing (outer part of the board cut away) or the board could originate from another tree." and "The outermost ring on the treble side is dated 1708. This date must be considered as *terminus post quem*". A second dendrochronological analysis undertaken by Dr Micha Beuting confirms these dates with a discrepancy of one year on the bass side, establishing that the tree rings date from 1592 to 1708 on the treble side and from 1563 to 1665 on the bass side.<sup>346</sup> This means that the tree from which this soundboard was made was still alive in 1708, and therefore it can be established that it was not made by Rauwolf.

The soundboard has multiple fractures, some repaired (clearly by more than one hand) and others still open, as well as evidence of woodworm damage. There are three small replaced sections of the soundboard close to the edge on the treble side (*Figure 124*).

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<sup>345</sup> Dr Karatina Cufar, University of Ljubljana, Biotechnical Faculty, Department of Wood Science and Technology. Dating report 19/01/2017.

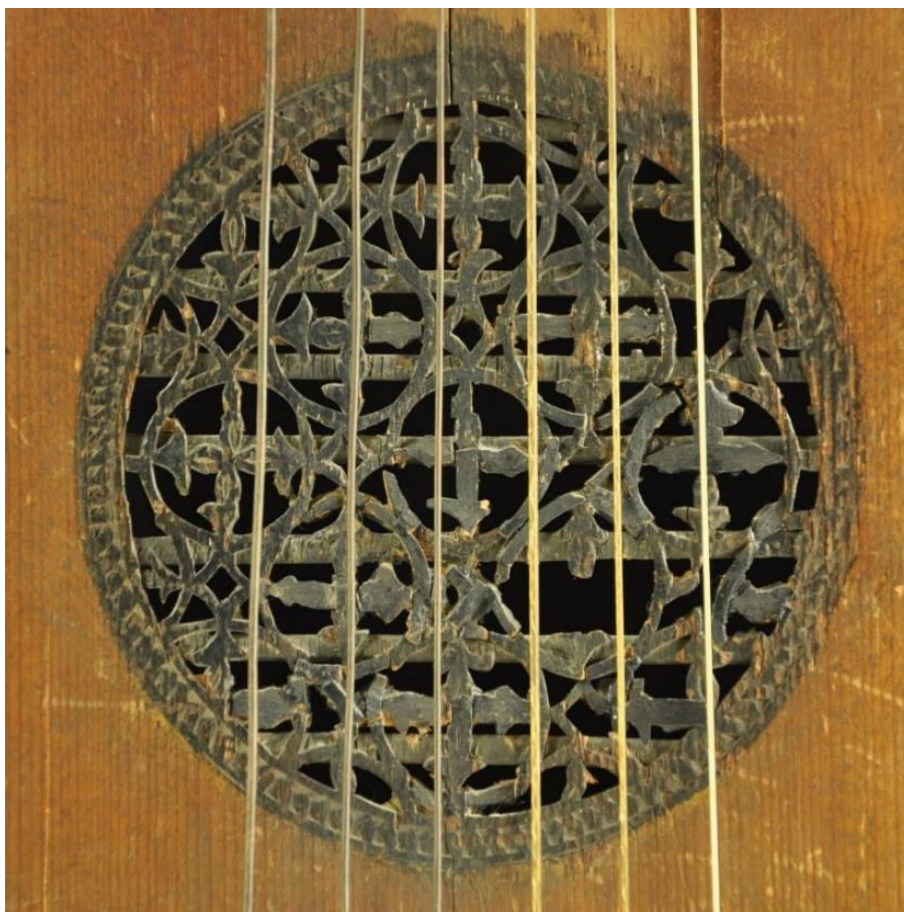
<sup>346</sup> Dating report by Dr Micha Beuting, dated 20/01/2017.



*Figure 124.* Replaced sections of the soundboard. Photographed by Jonathan Santa Maria Bouquet, 2014.

The rosette in the soundboard is carved following a geometric pattern of integrated circles and is coated with black varnish. Although the pattern of this rosette is not amongst the most commonly used in renaissance lutes, a very similar rosette is carved in the soundboard of a lute made by Max Unverdorven around the second half of the sixteenth century, currently part of the collection of the Museu de la Musica in Barcelona, Spain (no.408). There are clear traces of multiple repairs to the rosette and several sections of it are presently missing (*Figure 125*).





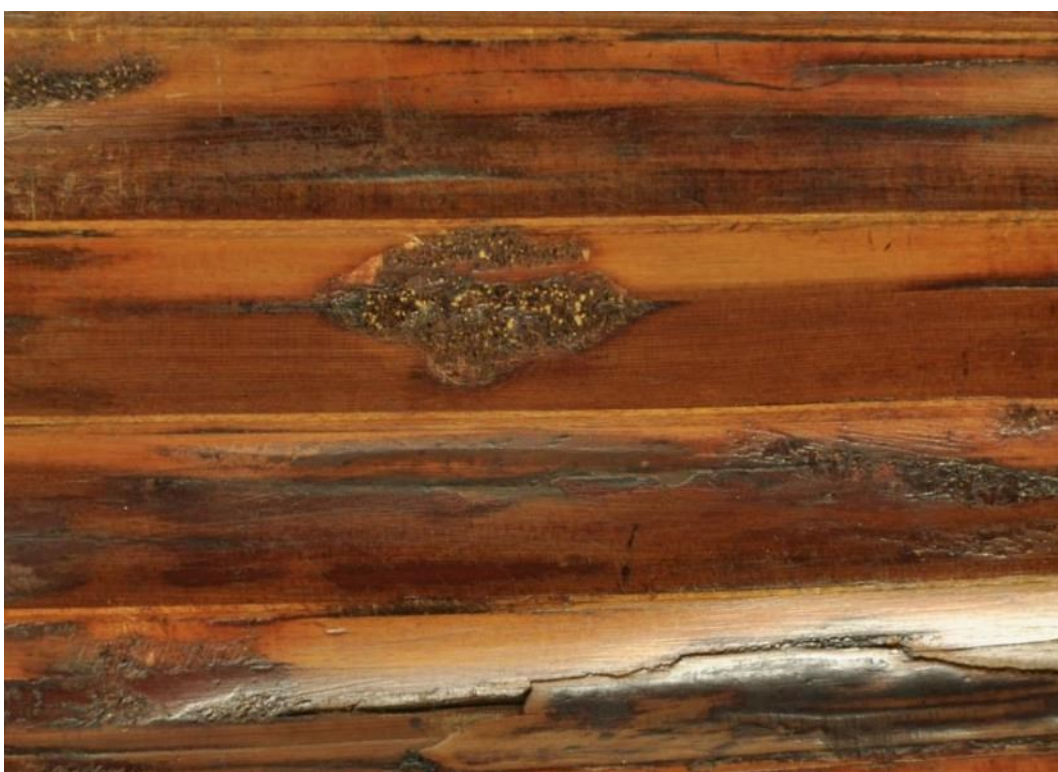
*Figure 125. Rosette of lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.*

The back consists of twenty-five ribs of shaded yew with maple spacers, each made of two thin strips of maple glued together longitudinally. There are numerous fractures in the ribs, some of which have been repaired using some sort of wood filler, mixed with what appears to be sand or grit (*Figure 127*). In the vicinity of the neck/body joint, some of the ribs are secured to the block with seven wooden dowels (*Figure 126*).





*Figure 126.* Detail of the neck/body joint of lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.



*Figure 127.* Detail of wood filler and fracture repairs on ribs of lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.

The clasp is made of two sections of shaded yew joined longitudinally with the same kind of spacers as the ribs. Like the clasp of lute 1598, it has a scored line running parallel along its contour approximately two millimetres from the edge. It also presents Rauwolf's mark branded in the middle and, similarly to

lutes 1598 and Undated, the brand was partially obliterated when a hole for a strap button was drilled (*Figure 129*). The decorative ends of the clasp are still almost complete although the outer ribs have been planed down in a previous repair (*Figure 128*).



*Figure 128.* Detail of the decorative end of the clasp. Photographed by Jonathan Santa Maria Bouquet, 2014.



*Figure 129.* Detail of the maker's mark branded on the clasp of lute 1612. Photographed by Jonathan Santa Maria Bouquet, 2014.



Figure 130. Front and back view of lute Undated. Photographed by Conrad Wolfram.

A detailed description of the instrument was written by Friedemann Hellwig in 1983, in which he established this lute as “most likely a work of the Sixtus Rauchwolf (Rauwolf), from which the bridge, neck and peg box are no longer reserved, also the internal bracing has been replaced”.<sup>347</sup> At the time of that report, this instrument is recorded as belonging to a private owner in Vienna.

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<sup>347</sup> Archives of the Germanisches National Museum, of Nuremberg. A copy of this report was kindly provided by Klaus Martius from the Institut für Kunsttechnik und Konservierung of the same museum.



In November 1988, this lute was offered for sale at an auction in Sotheby's in London (*Figure 131*). In the catalogue it was not listed as made by Rauwolf but as:

A Rare German Lute ascribed to Hans Neusidler, Nuremberg 1547, labelled *Hans Neusidler Lutenist in Nürnberg MDXLVII, the body of fifteen sycamore ribs with an orange-brown varnish, the table of pine of even grain with pierced and carved foliate and strap work rose, later bridge, neck and fingerboard, the latter two overlaid with ebony, the reflex pegbox also later and pegged for eight courses of strings, length of body 18 ½ in. (47 cm), string length 26 1/8 in. (66.3 cm.)*

Hans Neusidler, like his two sons Melchior and Conrad, is primarily known as a lutenist and composer. However in the Nuremberg judicial records he is twice described as a lute maker, both entries being 1550.<sup>348</sup>

After the auction, lute maker Michael Lowe had the opportunity to examine the lute out of the glass case. On looking at the brand mark on the clasp he recognised it as being that of Rauwolf,<sup>349</sup> after an article by Friedemann Hellwig published in the Galpin Society Journal in 1971.<sup>350</sup>

The lute was purchased by Jakob Lindberg, who entrusted it to a team of three instrument makers and restorers, namely Michael Lowe, Stephen Gottlieb, and David Munro, to undertake an extensive and complex restoration that lasted two years to bring it back to playable condition.

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*"Die Laute "Neusidler" ist demnach mit großer Wahrscheinlichkeit eine Arbeit des Sixtus Rauchwolf (oder Rauwolf), von der Steg, Hals und Wirbelkasten nicht mehr erhalten sind, auch inwendig dessen Bebalung verändert wurde".*

<sup>348</sup> Auction catalogue, Sotheby's London November 23 – 25 1988, Lot 693, p.302.

<sup>349</sup> In the text by Michael Lowe, in the article by Michael Lowe, Stephen Gottlieb, and David Munro "Restoring an original Sixtus Rauwolf lute" *Lute News* No. 83 (London: October 2007), 8.

<sup>350</sup> Friedemann Hellwig, "Makers' Marks on Plucked Instruments of the sixteenth and seventeenth Centuries." *The Galpin Society Journal* 24 (1971): 22-32.

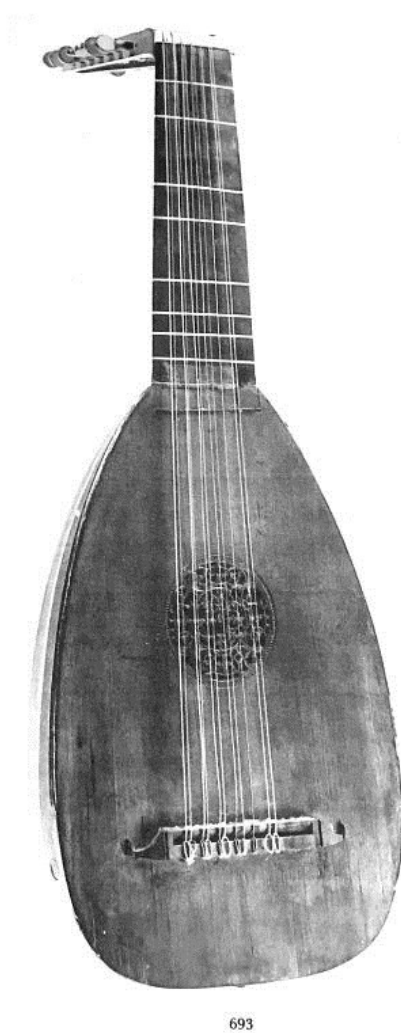


Figure 131. Photograph of lute Undated as published in the Sotheby's auction catalogue. November 1988, 303.



Figure 132. Undated lute as purchased by Mr Lindberg in 1989.<sup>351</sup>

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<sup>351</sup> Photograph kindly provided by Mr Lindberg on 24/01/2017.

The lute was in a rather precarious state of conservation, yet according to Stephen Gottlieb it was “fairly complete”.<sup>352</sup> Michael Lowe described it as follows:

There were a number of problems with the instrument; parts of the rose were missing, damage to the edge of the soundboard, a very nasty looking bridge, the neck glued on a rather strange angle. The pegbox looked rather horrible.<sup>353</sup>

Currently this instrument belongs to the lutenist Jakob Lindberg, who plays it regularly in concerts and recordings.<sup>354</sup>

### Description of the instrument

Although there is no maker's label inside this instrument, distinctive characteristics of its construction, such as the decorative ends of the clasp and the presence of the maker's mark on the clasp, allow a confident attribution of its manufacture to Sixtus Rauwolf.

Formerly, this instrument had been dated as ca.1590 by Gottlieb and Lowe.<sup>355</sup> During an informal conversation with Gottlieb he explained the attributed date was estimated due to the corpus of Rauwolf's work known at the time, most of it being built in that decade. However, at the present time it is known that Rauwolf's active period extends from 1577 to at least 1625, and therefore it is plausible that this lute could have been made at any point during that period.

A dendrochronology analysis of the wood of the soundboard dates the growth rings from 1418 to 1560, which indicates the tree from which it was made was

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<sup>352</sup> <http://www.lutemaker.com/> consulted on 01/12/2016.

<sup>353</sup> Michael Lowe, Lute News No. 83, 8.

<sup>354</sup> Lindberg, Jakob. *Weiss Lindberg Sonatas played on the unique 1590 Sixtus Rauwolf Lute*, BIS- CD – 1524, 2005.

<sup>355</sup> Christopher Goodwin. "Lutes and Voices." *Early Music* 36, no. 1 (2008), 140. <http://www.jstor.org/stable/30136049>.



still alive in 1560 and therefore it must be considered as *terminus post quem*. Allowing for five years of air-drying the wood, and a handful of yearly rings removed whilst processing the wood and making the soundboard, the dendrochronology determines that this lute cannot have been made before 1570, which is consistent with Rauwolf's active period, but does not clarify the date on which it was actually made.

The rather small number of extant lutes by Rauwolf makes it very difficult to reach a definite conclusion for establishing the date in which this lute was built. Due to this uncertainty, for the purpose of this thesis this lute will be referred to as 'Undated' rather than given an estimated date.

Although the maker's label is missing, there are two repair labels glued inside the back of this instrument (*Figure 133*), which read:

Leonhard Mausiel Nürnberg / Reparirt 1715

and:

Reparirt Karl S. Patnia Wien 1881<sup>356</sup>

A third label, which appears to be somewhat damaged, is also glued to the back; it reads:

Hansen Neusidler Lutennist / zu Nurnberg M D XLVII.

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<sup>356</sup> Referred to as Karl F. Palma in Hellwig's report.



Figure 133. Detail of the label of the lute Undated. Photographed by Stephen Gottlieb.<sup>357</sup>

This last label is interesting in part because Neusidler was a renowned lute player and composer, and lutenist labels are not common at all, and because the date 1547 (MDXLVII) is too early for this instrument. Most likely this label represents a forgery attempt rather than a maker's or a repair label. Comparing it to the title page of Hansen Neusidler's *Das erst Buch: ein newes Lautenbüchlein mit vil feiner lieblichen Liedern, für die jungen Schuler*, published in Nuremberg in 1547, it can be determined that this pseudo-label is a composite made by manipulating a section of the title page (Figure 134Figure 135).<sup>358</sup>

<sup>357</sup> All the images by Stephen Gottlieb are used here with his explicit authorization.

<sup>358</sup> As noted in Hellwig's report of 1983.

# Das Erst Buch.

Ein Newes Lautenbüchlein mit vil feiner lieblichen Liedern/  
für die jungen Schuler/die fein leicht vnd ganz ring zu lernen seind / auchertlich  
feine Tenz / Welisch vnd Französische Stück/ die fein artlich vnd lieb-  
lich Colerirt / mit sündern sters verfaßt / vnd zusammen gebracht/  
durch mich Hansen Neusidler Lutennisten vnd Burger  
zu Nürnberg / offentlich aufgangen / im  
M. D. XLVII.

g. Mit Römischer Kay. vnd König. May. freyheyt/  
im Fünff Jaren nicht nach zu drücken.  
Begnadet. /

Figure 134. Title page of Hansen Neusidler's *Das erst Buch: ein neues Lautenbüchlein mit vil feiner lieblichen Liedern, für die jungen Schuler*, Nuremberg in 1547. Highlighting the area used for the label inside lute Undated.

Hansen Neusidler Lutennist  
zu Nürnberg / M. D. XLVII.

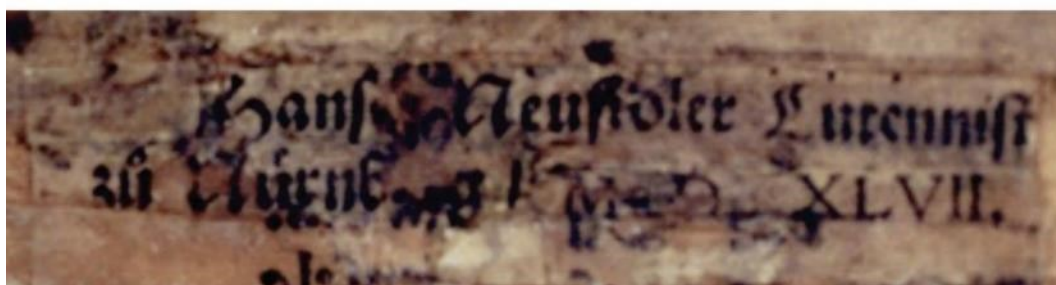


Figure 135. Section of the title page of Neusidler book digitally manipulated to match the label inside the Undated lute (below).

As the date of manufacture for this lute is hard to establish, we could assume it was originally conceived as an eight-, nine-, or ten-course lute. The current neck width could certainly allow for ten or eleven courses. The repair label of 1715 by the Nuremberg based lute maker Leonhard Mausiel suggests it was most likely converted to an eleven-course lute. Therefore, if this was originally conceived as a seven-, eight-, or nine-course lute, the original neck and pegbox were replaced; on the other hand, if it was conceived as a ten-course instrument

the transformation to eleven-courses could be achieved by merely adding a rider for the first course, retaining the original neck but replacing the flat fingerboard with a curved one as required for this kind of lute.

It is not clear what kind of repair was carried out by Patnia in 1881, but previous to the 1991 restoration, this instrument had “a very nasty looking bridge”,<sup>359</sup> the pegbox was not original and “looked rather horrible”, “some rather crude edging strips of rosewood certainly not an original historical feature”.<sup>360</sup>

The current neck is made of a very dense piece of pine wood veneered in ebony, and in 1991 it “was hardly joined to the body”.<sup>361</sup> During the latest treatment it was decided to return the instrument to its “last playable condition” as an “eleven-course lute (with the option of ten-course stringing)”.<sup>362</sup> The neck was removed and the angle re-set by Stephen Gottlieb. The fingerboard was retained, but a new pegbox for eleven courses with a rider for the first string was added.

The soundboard is made of two pieces of spruce of very narrow regular grain, radially-cut and bookmatched. Previous to the restoration, the soundboard was entirely covered in dark shellac varnish which was removed by David Munro.<sup>363</sup> Apparently, under this shellac coat the soundboard was originally coated with some sort of sealer which prevented the varnish from infiltrating the wood. Numerous fractures on the soundboard were also treated by Munro.

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<sup>359</sup> Lowe, 8.

<sup>360</sup> Lowe, 9.

<sup>361</sup> Ibid.

<sup>362</sup> On the text by Stephen Gottlieb, in the article “Restoring an original Sixtus Rauwolf lute” *Lute News* No. 83 (London: October 2007), 15.

<sup>363</sup> On the text by Munro, in the article “Restoring an original Sixtus Rauwolf lute” *Lute News* No. 83 (London: October 2007), 10.



At the time of its acquisition in 1991 the lute still retained some of the original braces, although some of them had been truncated, probably by Karl S. Patnia in 1881, when diagonal braces were added (*Figure 136*).



*Figure 136.* Internal view of the soundboard of the Undated lute showing evidence of the diagonal braces. Photograph by Michael Lowe.

During the restoration treatment, these truncated braces were completed by grafting new material, and the missing braces were replaced using “period wood” obtained by guitar maker Andrea Tacchi from reclaimed furniture from the library of the Palazzo Pitti in Florence (*Figure 137*).



*Figure 137.* Internal side of the soundboard of lute Undated after the restoration treatment. Photographed by Stephen Gottlieb.

The rosette carved on the soundboard features a geometric vine pattern surrounded by a decorative border. Previous to the recent restoration treatment it was badly damaged and considerable sections were missing. Its restoration was carried out by David Munro (*Figure 138*).





Figure 138. Rosette of lute Undated before and after the treatment. Photographs: left by Michael Lowe, right by Stephen Gottlieb.

The bridge was replaced by Stephen Gottlieb, and allowed the instrument to be strung either as a ten-course with Renaissance tuning, or as an eleven-course with baroque tuning (*Figure 139*).



Figure 139. Bridge of lute Undated. Photographed by Stephen Gottlieb.

The back is made of fifteen ribs of “a very attractive and finely varnished maple”<sup>364</sup> with no spacers, and it has a somewhat elongated outline (*Figure 140*). These are all atypical features for Rauwolf’s work; this is his only extant lute made of a relatively small number of ribs, the only one made of maple, the only one without spacers, and the only one with an elongated outline. These are all

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<sup>364</sup>Not a matching set according to Lowe.

characteristics that evoke the lutes of the Bologna school of the beginning of the sixteenth century. Conversely, the number of ribs of this instrument is not quite consistent with the known lutes of that school,<sup>365</sup> and it is also atypical for the lutes built when this lute was likely made. Of the known extant lutes built in this period, only a handful have a back made of fifteen ribs: two of them made in Füssen, one by George Greiff in 1590, and one by Wolfgang Wolf in the second half of the sixteenth century, both of them with yew ribs; two made in Venice, one by Magnus Tieffenbrucker in 1576, of maple ribs with ebony spacers, and one made by Jacob Hes in 1586, with ivory ribs and triple spacers (black wood/ ivory/ black wood); one made in Antwerp by Mateu Hofmans in 1605 also with ivory ribs and triple spacers; and one made in Padua by Vendelio Venere in 1584, with yew ribs.<sup>366</sup>



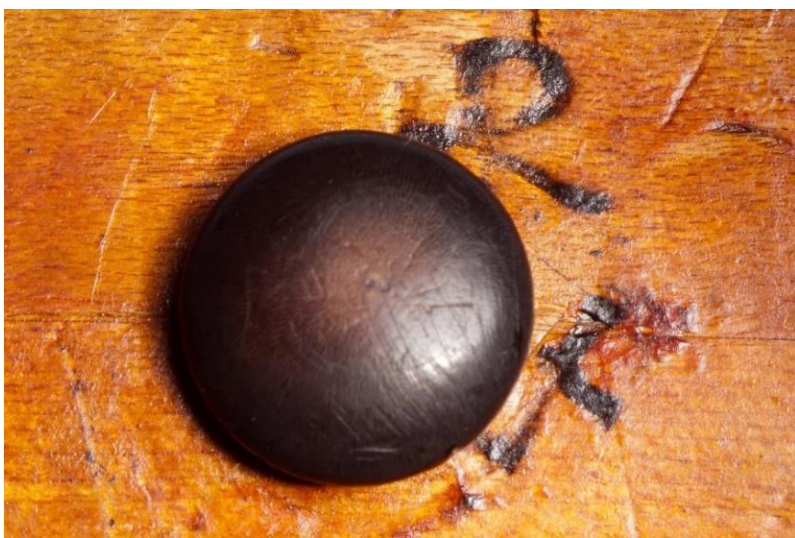
*Figure 140. Detail of the back of lute Undated. Photographed by Conrad Wolfram.*

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<sup>365</sup> Which normally have nine to thirteen ribs.

<sup>366</sup> Information retrieved from the Lautenweltadressbuch, A List of Extant Historical Lutes compiled by Klaus Martius, available online at <http://www.cs.dartmouth.edu/~lsa/associated/LuteDBCover01.html>

The clasp is made of two pieces of the same material as the ribs joined together longitudinally, and it has a scored line running parallel along its contour approximately two millimetres from the edge, similar to the 1598 and 1612 lutes. Also, like in these two instruments, the clasp shows part of Rauwolf's brand which was damaged by the subsequent addition of a strap button, and although the stamps were not produced by the same branding iron, they are obviously the same design (*Figure 141*). The characteristic decorative ends of the clasp present an excellent state of conservation (*Figure 142*), and on the bass side there is "a little wax seal with a coat of arms in the cut-away at one end of the capping strip" (*Figure 143*).<sup>367</sup> The design on this seal is not clear, and to the present day it has not been deciphered. It appears to be some sort of heraldic symbol, possibly stamped by a previous owner rather than a maker's mark.



*Figure 141.* Detail of the maker's brand on the clasp. Photographed by Conrad Wolfram.

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<sup>367</sup> Ibid.





*Figure 142.* Detail of the decorative end of the clasp. Photographed by Conrad Wolfram.



*Figure 143.* Detail of wax seal. Photographed by Conrad Wolfram.

### **Cross examination of the documented lutes**

The only original part of all extant lutes by Rauwolf is the body, formed by the back and the soundboard.<sup>368</sup> Therefore, cross examining their dimensions, proportion and shape, as well as the materials employed for their construction, and aesthetical elements, provides a valuable insight to Rauwolf's work.

When studying the outline of the body of old instruments, it is important to understand that the current outline is certainly different from its original form. Contrary to the assertion made by Friedman Hellwig, who paraphrases Michael Prynne saying it is a "... fact that the outline survives undamaged almost any repair or alteration of the instrument",<sup>369</sup> the repairs and modifications that took place in the last 400 years, like the removal of material of the last two ribs to adjust the action of the instrument, or replacing the soundboard, can certainly alter the outline significantly. Furthermore, the shrinkage due to the inherent anisotropic properties of wood also causes variations in their proportions and dimensions. Nonetheless, it is also plausible that differences in size and shape, as well as deformation and asymmetric features could in fact be manufacturing errors by Rauwolf when the lutes were first built. Often the ideal dimensions and lines of the technical drawing are not exactly reproduced in the physical object due to human error.

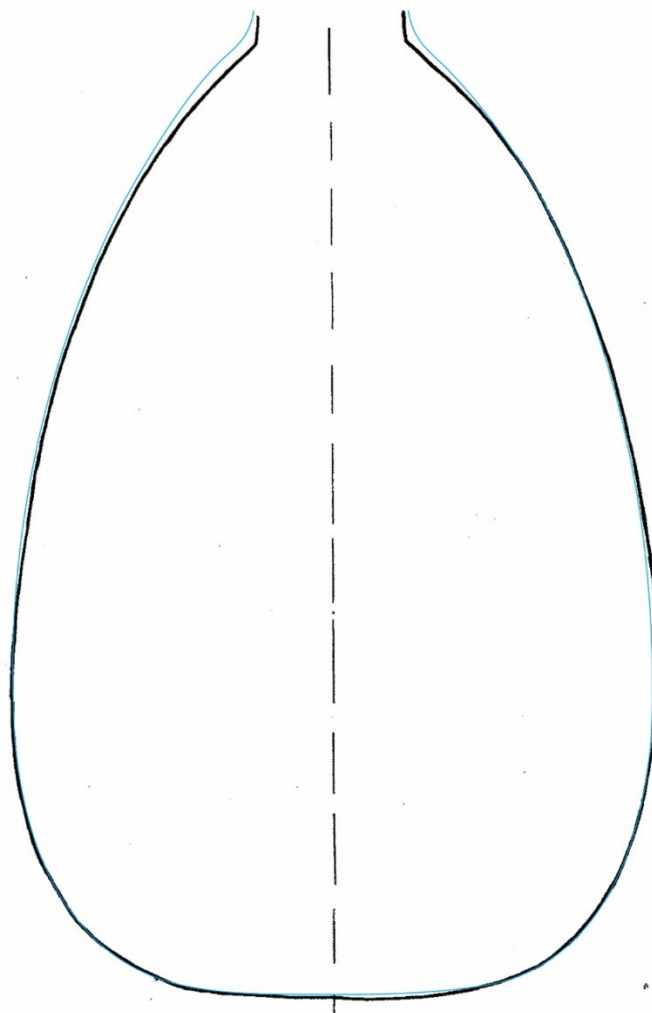
With all this in mind, the outlines of Rauwolf's lutes were compared and studied by superimposing and manipulating the digital drawings of the individual instruments previously generated. Through this analysis it can be concluded that there are two basic body shapes, one 'Round model' shared by

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<sup>368</sup> Excluding the soundboard of lute 1612 which is not original.

<sup>369</sup> Friedemann Hellwig, "Lute Construction in the Renaissance and the Baroque", *The Galpin Society Journal*, Vol. 27 (May, 1974), 22.

the majority the studied lutes,<sup>370</sup> which resembles the 'Rounded shape' as described by Rizzi,<sup>371</sup> similar to the so-called Venice style (*Figure 144*); and a 'Long model' with a slightly narrower and longer outline in concordance with the 'Elongated shape' as described by Rizzi,<sup>372</sup> similar to the Bologna style (*Figure 145*).<sup>373</sup>



*Figure 144.* Outline of lute 1596 (blue line) scaled down and superimposed onto the outline of a lute by Giovanni Hiebbber, 1561. MIM Brussels, drawn by Tiziano Rizzi as an example of a 'Rounded shape' lute.<sup>374</sup>

<sup>370</sup> Lutes 1577, 1593, 1596, and 1598.

<sup>371</sup> Rizzi, *Liuteria* no.14, 36.

<sup>372</sup> *Ibid*, 38.

<sup>373</sup> Lutes 1612 and Undated.

<sup>374</sup> *Ibid*, 37.



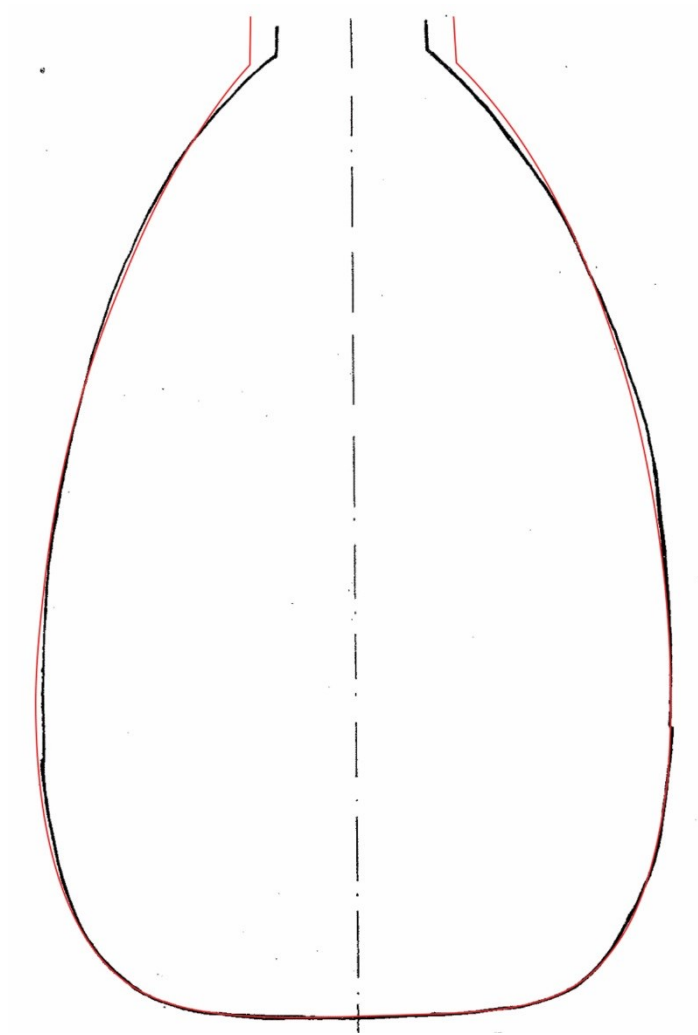


Figure 145. Outline of lute Undated (red line) scaled down and superimposed onto the outline of a lute by Marx Unverdorben. Museu de la Musica de Barcelona (nr.408) drawn by Tiziano Rizzi as an example of an 'Elongated shape' lute.

Superimposing the digital versions of the outlines of Rauwolf's lutes is an interesting exercise in design and reverse engineering. A chronological comparison by pairs shows remarkable similarities. The outline of lute 1577 is almost identical to that of lute 1593 (*Figure 146*); similarly, the outline of lute 1593 closely resembles that of lute 1596 (*Figure 147*), and 1596 to 1598 (*Figure 148*). However, there is a change in the lower section of the outline progressing towards a flatter bottom with curves of a smaller radius towards the sides; this difference is quite evident when comparing the outline of lute 1577 with that of lute 1598 (*Figure 149*).

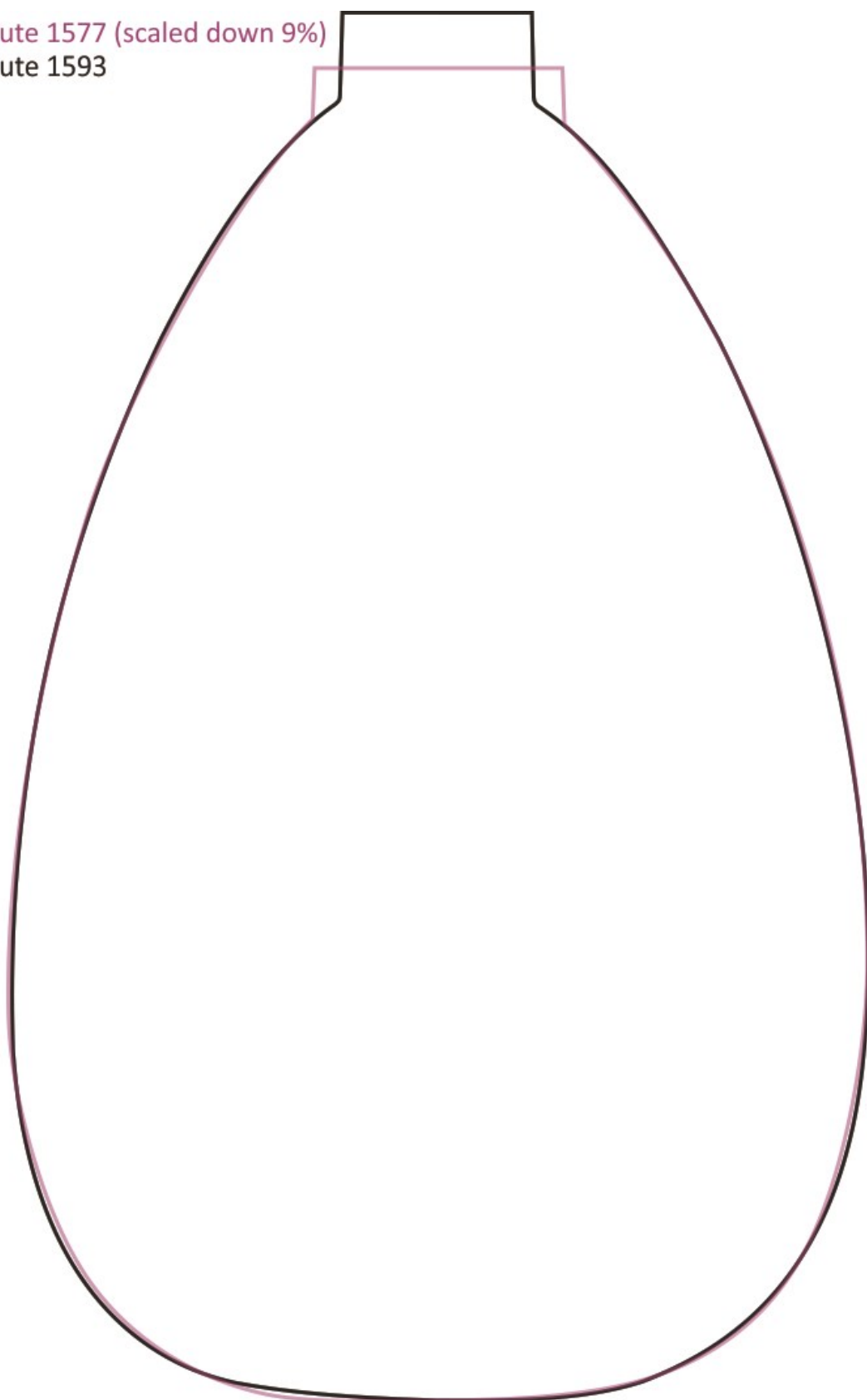
The outline of lute 1612 is definitely different from the previous lutes. Scaling lute 1612 by 2% down in size to match the width of lute 1598, it can be observed that although the bottom section in both is similar, its upper section is more elongated (*Figure 150*). The fairly small difference in size between the two is also remarkable, lute 1612 being only 6mm wider and ca. 29mm longer than lute 1598, which effectively does not account for a lute in a different register, although it most likely had a different string length which could account for a difference in pitch. Alternatively, this slightly larger body could be evidence of an attempt to obtain a larger volume of air-mass within the body rather than a matter of register.

The outline of lute Undated, although similar to that of lute 1612, is not entirely the same model. Smaller than 1612 by about 6%, the bottom section is very similar but the upper section is significantly narrower (*Figure 151*), though this difference in shape could be a deformation as a result of the soundboard replacement this instrument went through. Whilst the bottom section is reinforced by the counter-cap and the clasp, and therefore less prone to lose its shape by means of applying pressure, the upper section is quite flexible and could have been forced to this new narrower shape.

When comparing the outline of lute 1598 to that of lute Undated scaled up by 4.5% to match their body widths, it is evident that although the bottom section is similar, its upper section is significantly longer (*Figure 152*).

Another way to interpret the difference between the same two instruments is by comparing their outlines without modifying their size. Under these conditions, the two are roughly the same length, but the Undated lute is considerably narrower (*Figure 153*).

Lute 1577 (scaled down 9%)  
Lute 1593



*Figure 146.* Superimposed outlines of lutes 1577 (scaled down 9%) and 1593.

Lute 1593  
Lute 1596

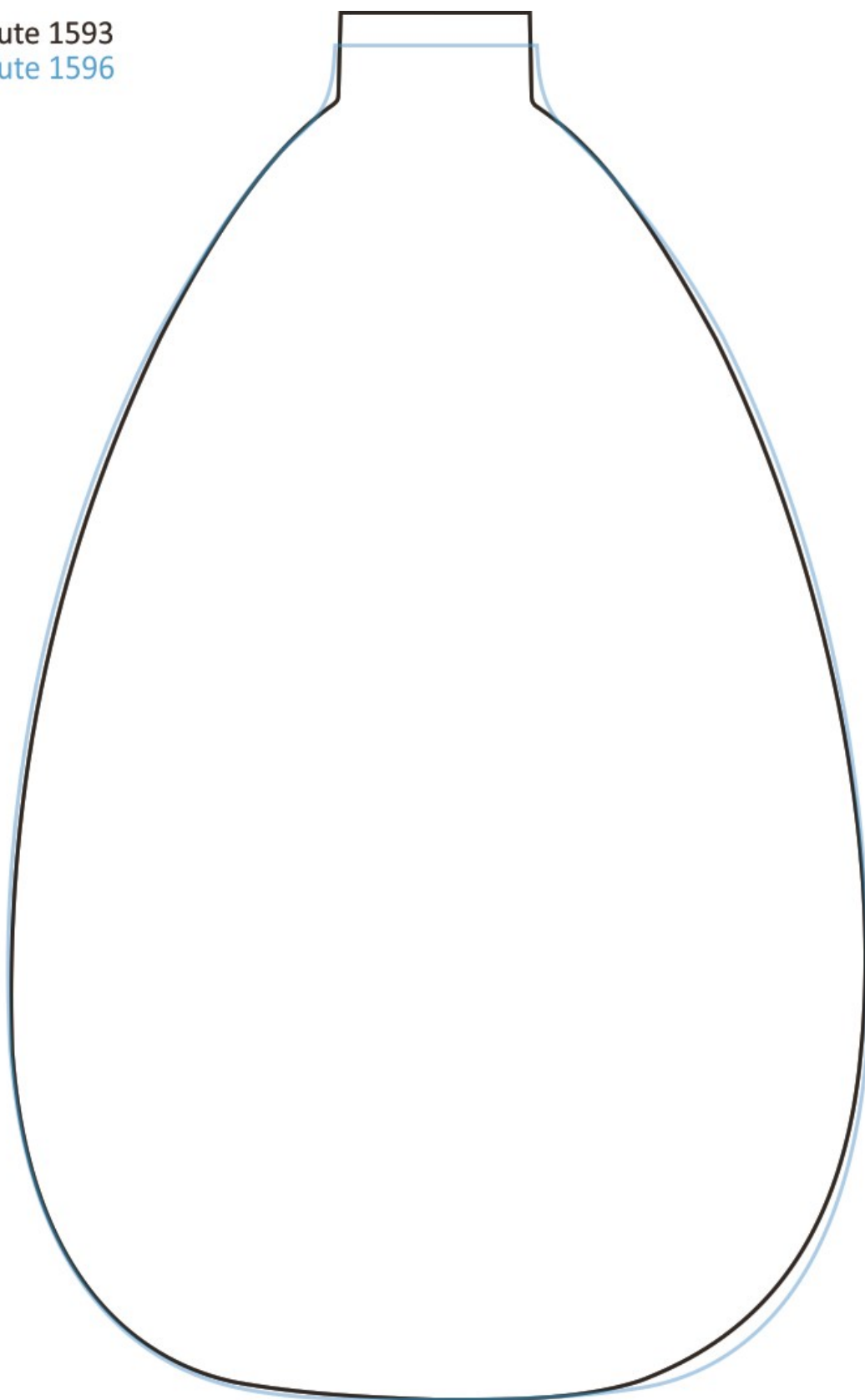


Figure 147. Superimposed outlines of lutes 1593 and 1596.

Lute 1596  
Lute 1598  
(scaled down 4.5%)

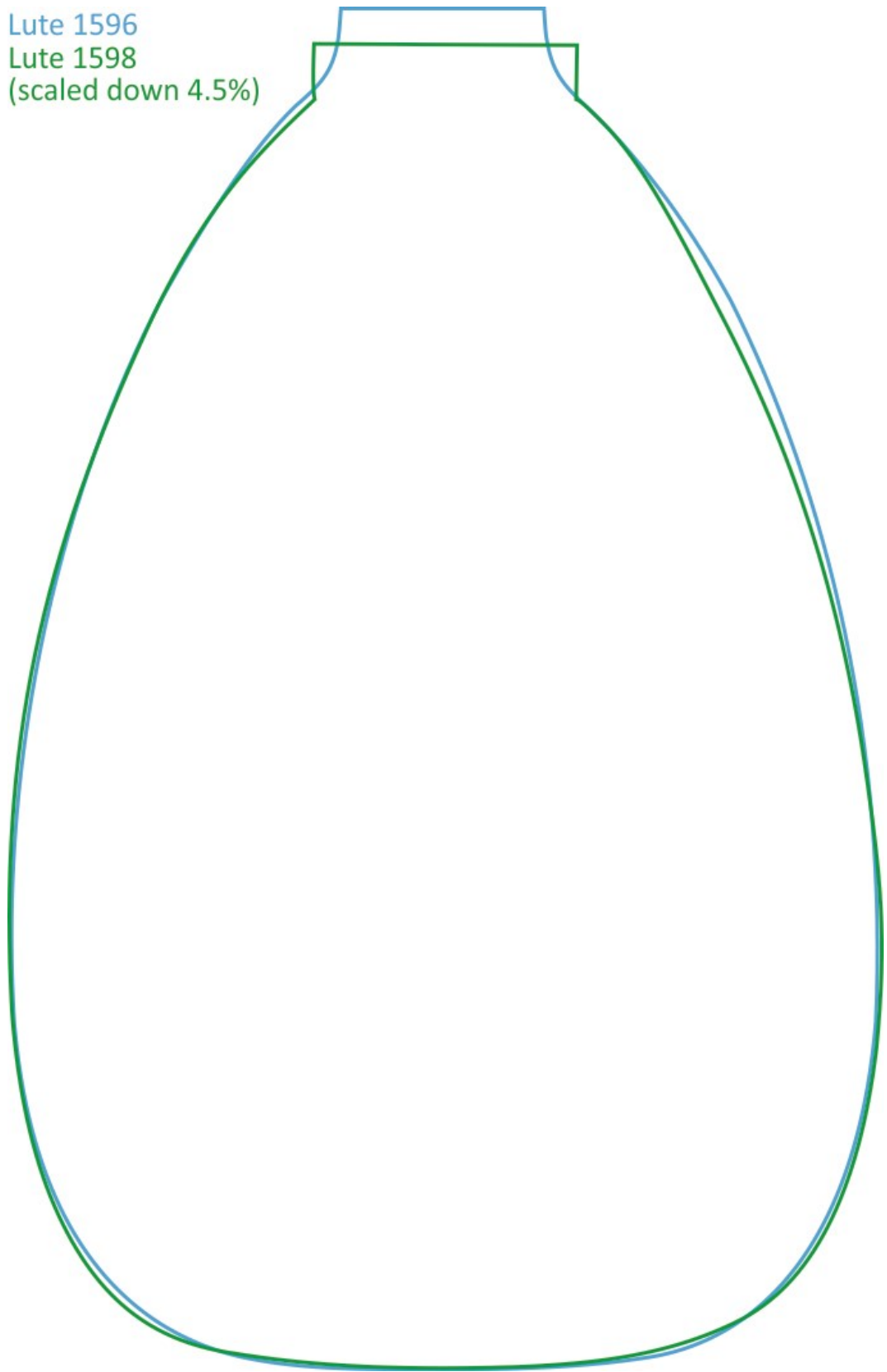


Figure 148. Superimposed outlines of lutes 1596 and 1598 (scaled down 4.5%).

Lute 1577  
(scaled down 4.5%)  
Lute 1598

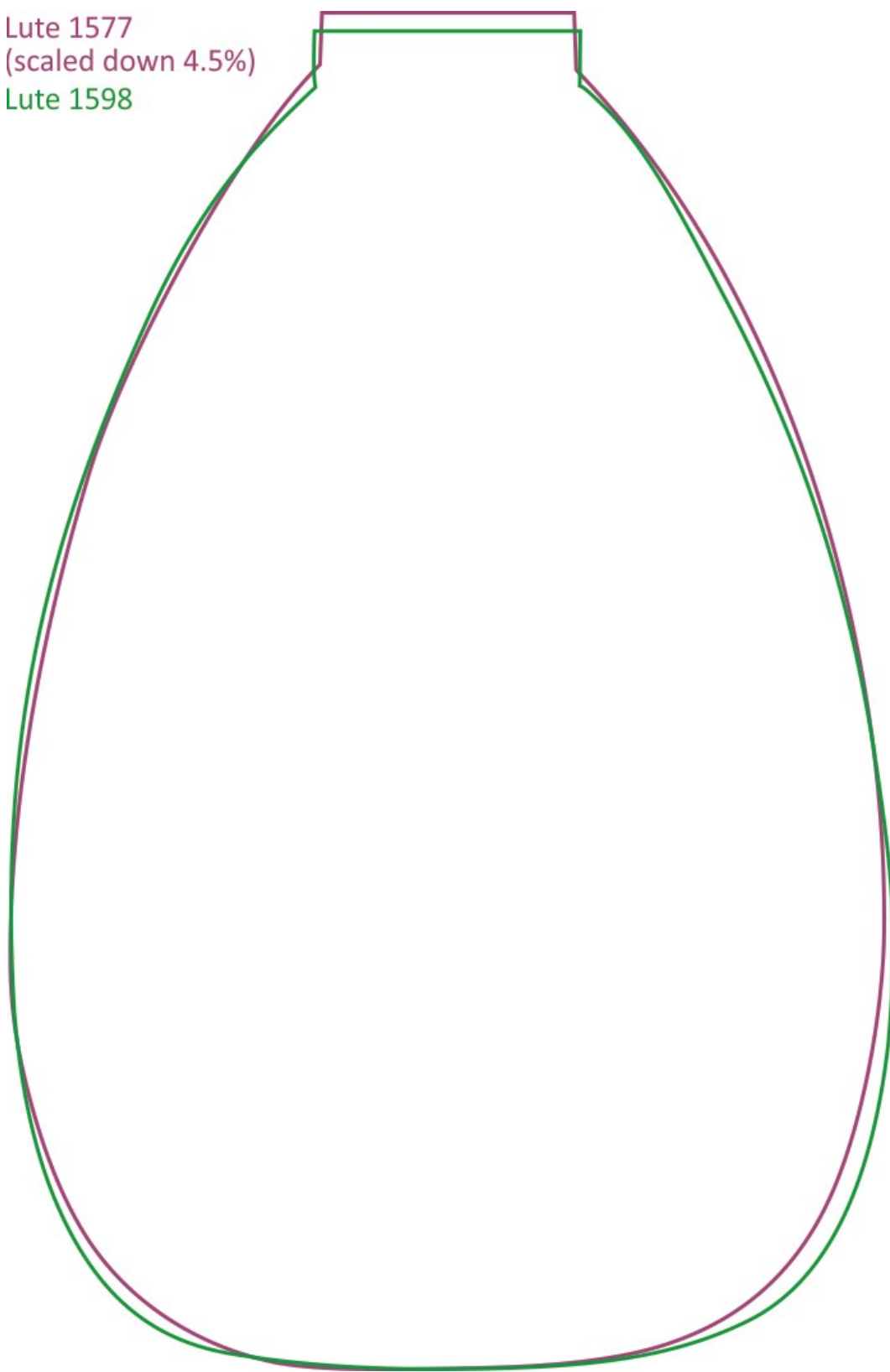


Figure 149. Superimposed outlines of lutes 1577 (scaled down 4.5%) and 1598.



Lute 1598  
Lute 1612  
(scaled down 2%)

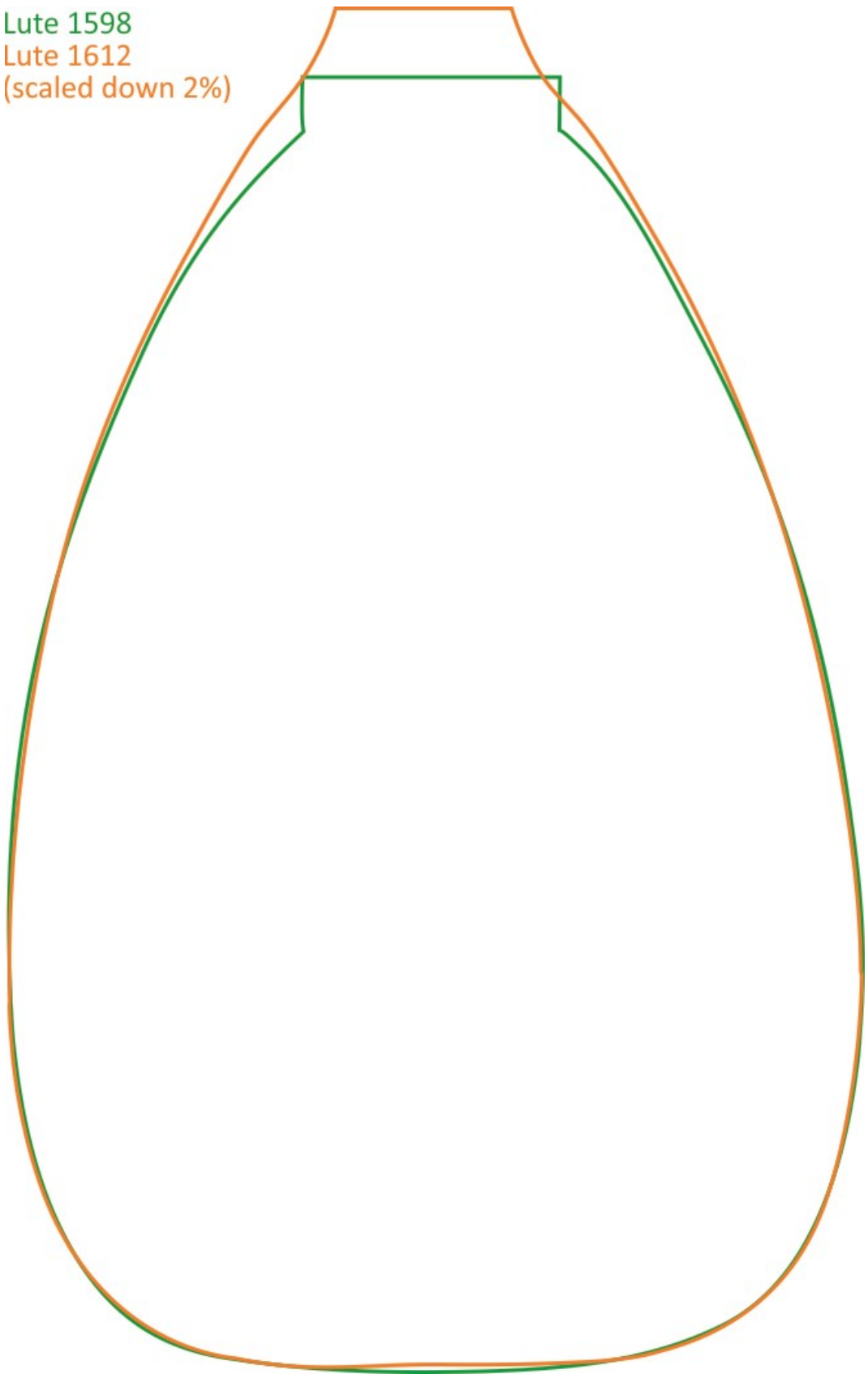


Figure 150. Superimposed outlines of lutes 1598 and 1612 (scaled down 2%).

Lute Undated  
Lute 1612  
(scaled down 6%)

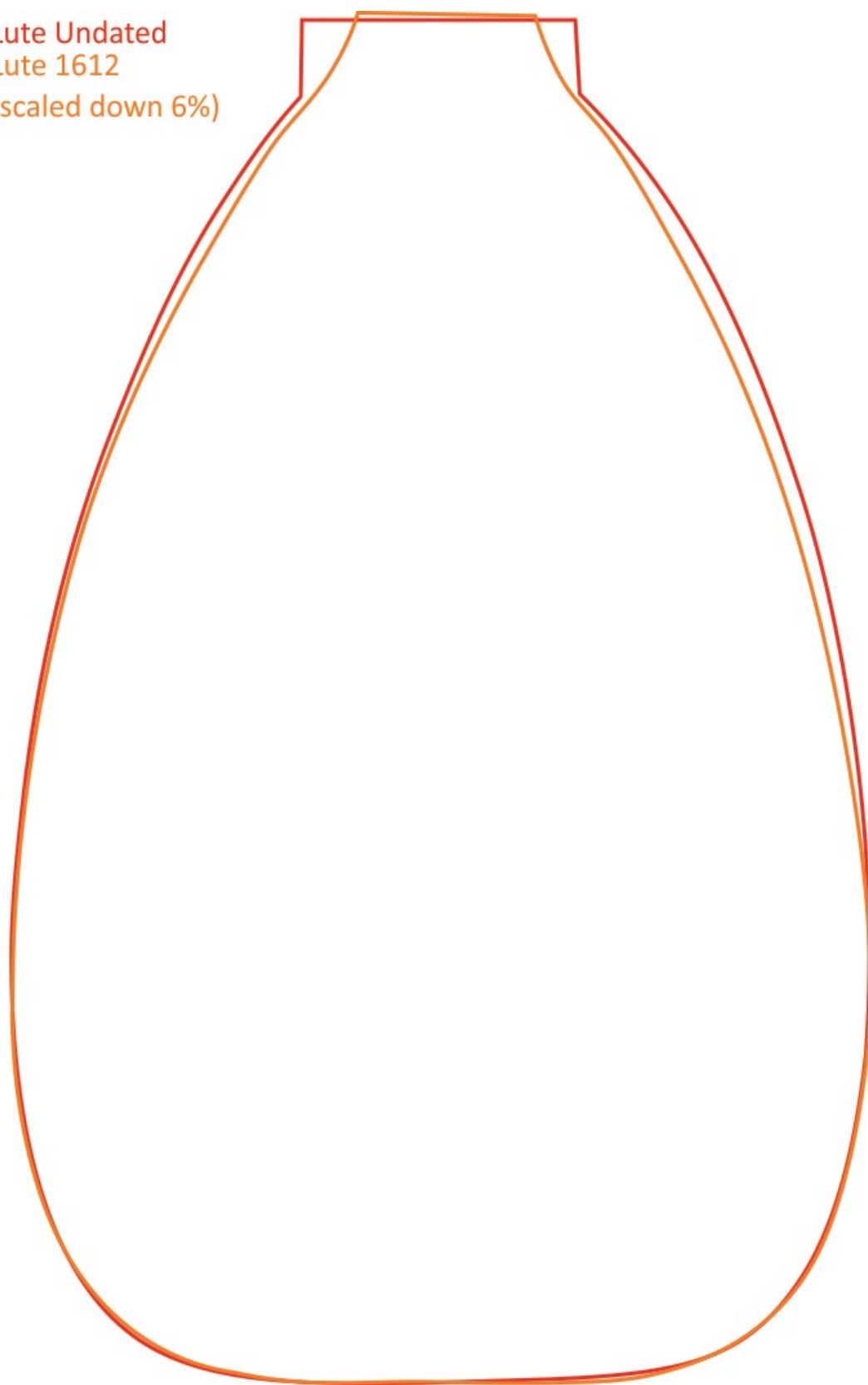


Figure 151. Superimposed outlines of lutes 1612 (scaled down 6%) and Undated.

Lute 1598  
Lute Undated  
(scaled up 4.5%)

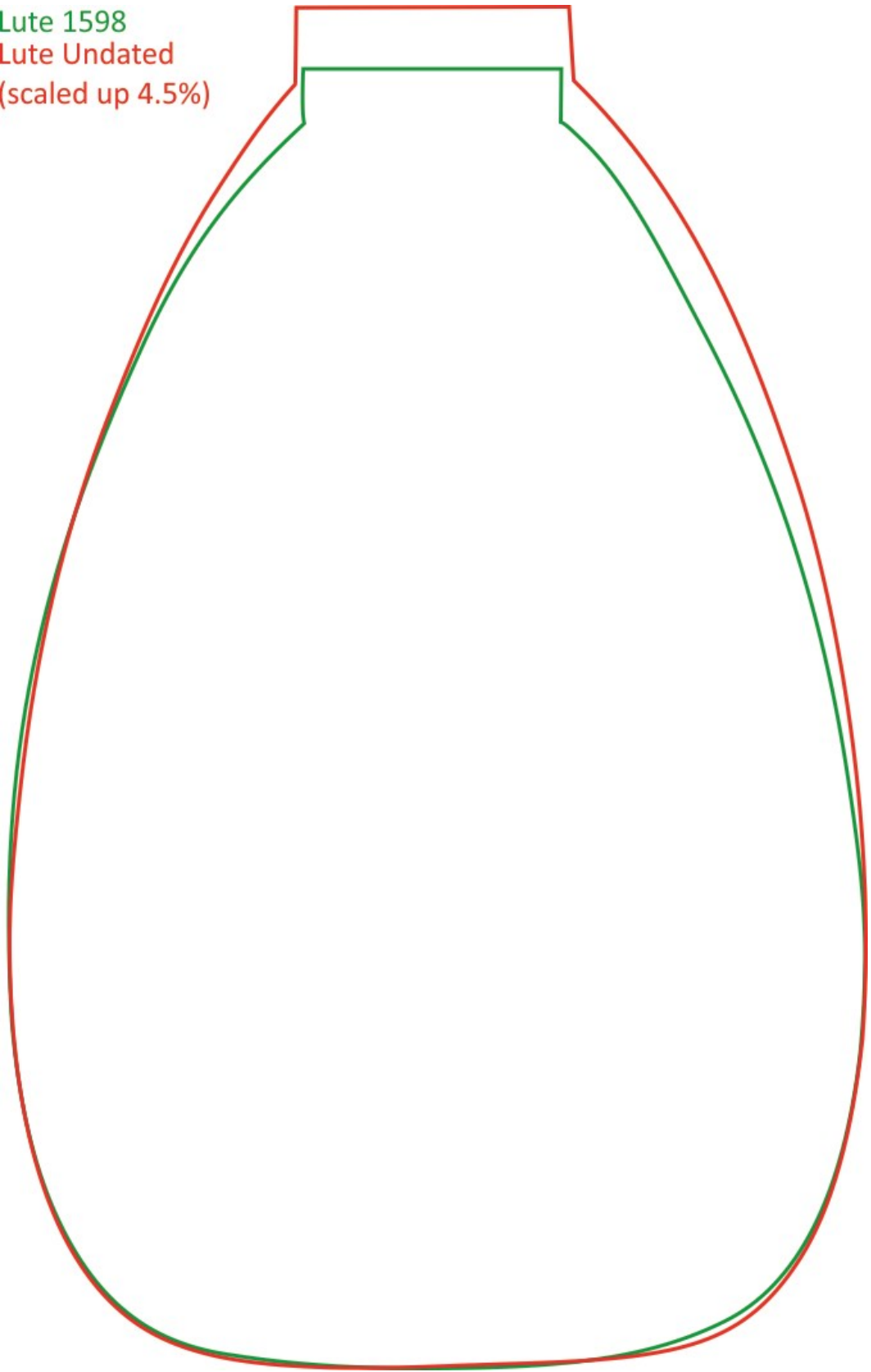


Figure 152. Superimposed outlines of lutes 1598 and Undated (scaled up 4.5%).

Lute 1598  
Lute Undated

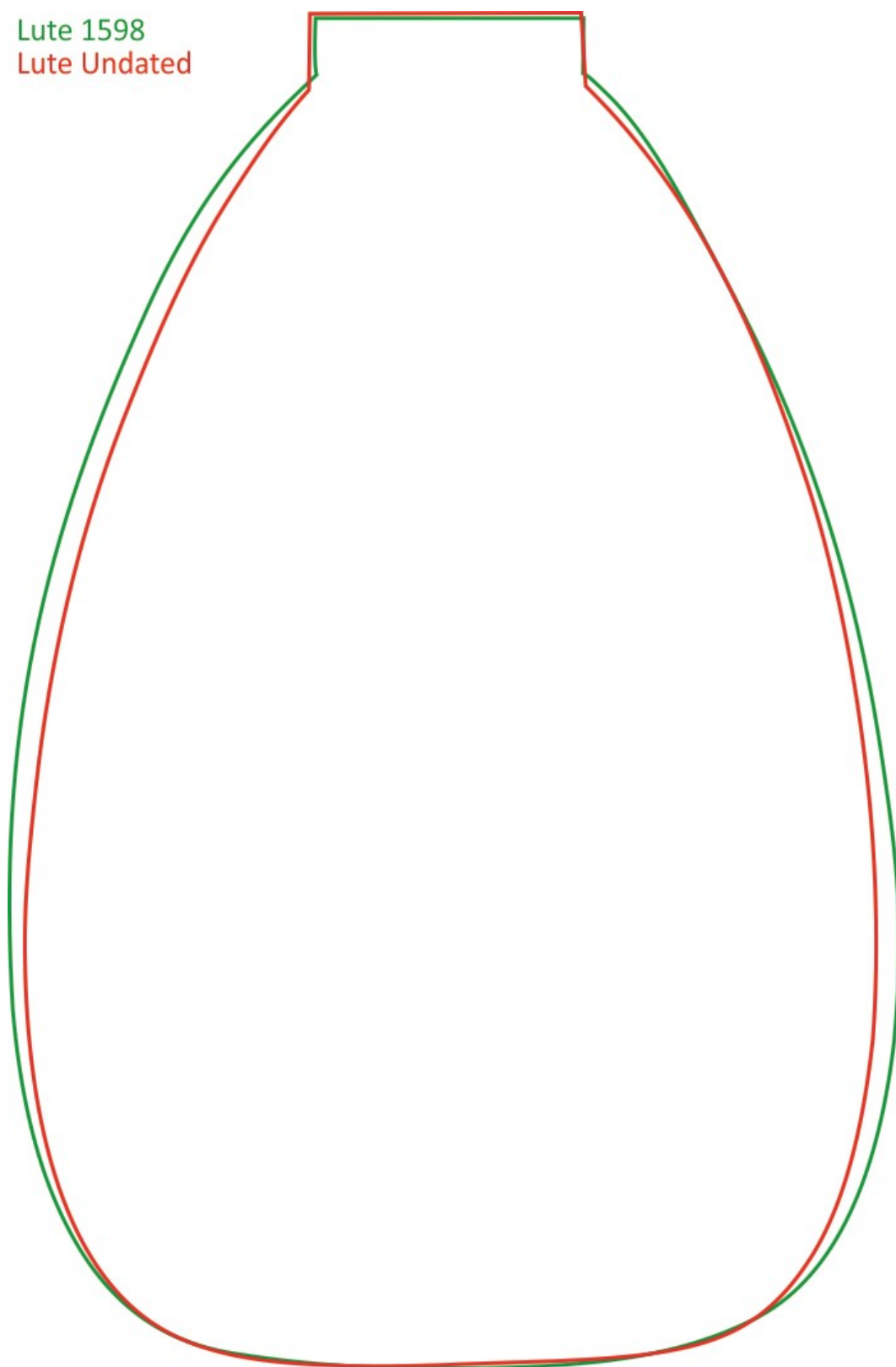


Figure 153. Superimposed outlines of lutes 1598 and Undated.

The materials and number of ribs Rauwolf employed for the construction of the back of his instruments is somewhat atypical in comparison with the pre-established lute-making schools:

<b>Lute</b>	<b>Ribs</b>	<b>Material</b>	<b>Spacers</b>	<b>Uncommon trait</b>
<b>1577</b>	13	Brazil wood	Light-coloured wood	Small number of ribs for the construction date.
<b>1593</b>	27	Lignum vitae	Ivory	Only known extant lute made with this material.
<b>1596</b>	25	Ebony	Ivory	Usually lutes made with ebony are archlutes or chitarrone.
<b>1598</b>	25	Plain yew	Ivory	Most commonly lutes made with plain yew have no spacers, or light-coloured wood spacers.
<b>1612</b>	25	Shaded yew	Double spacers, light-coloured wood	The use of double spacers is not prevalent in lutes of this period.
<b>Undated</b>	15	Maple	No spacers	Lutes of elongated style are commonly formed by 9, 11, or 13 ribs.

The decorative ends of the clasp are a characteristic feature of Rauwolf's work, and they are consistent throughout his work, with the exception of those found on lute 1577. This could be attributed to the fact that this instrument was made in an early stage of Rauwolf's career, before he developed his personal style (*Figure 154*).



Figure 154. Detail of decorative ends of the clasp.

The scored line running parallel to the outline of the clasp present on the lutes made with softer wood (1598, 1612, and Undated) is also a feature characteristic of Rauwolf's work. The only other known lute maker that uses a similar decorative technique is Gregori Ferdinand Wenger, who was also from Augsburg though his productive life took place more than one hundred years after Rauwolf's, around the first half of the eighteenth century (Figure 155).





Figure 155. Detail of clasp decorative line, comparing lute by Rauwolf 1612 (top) and Mandora by Wenger 1726, MMA 89.4.3140 (bottom). Photographed by Jonathan Santa Maria Bouquet.

Three of the instruments feature Rauwolf's mark branded on the clasp; unfortunately in all cases this brand has been partially obliterated by the addition of a strap button. The complete monogram is found handwritten on the label of lute 1593 (Figure 156).

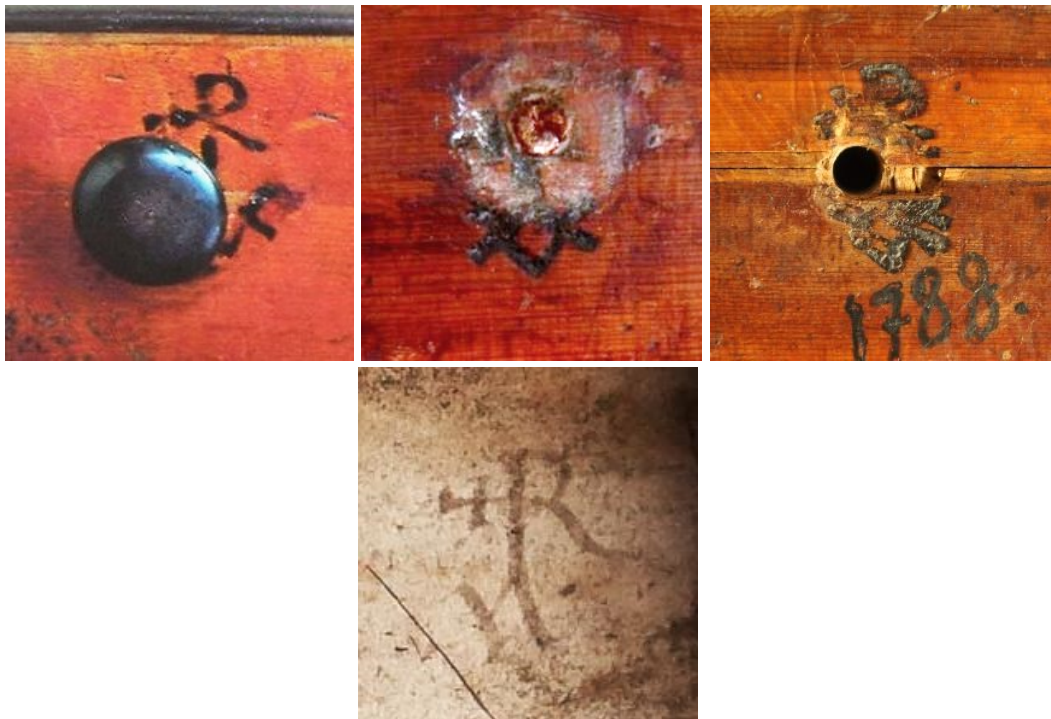


Figure 156. Detail of the Rauwolf monogram branded on the clasp of lutes Undated, 1598, and 1612 (left to right), and handwritten on the label of lute 1593.

All of the soundboards made by Rauwolf share characteristics: each is made of two pieces of spruce of very narrow regular grain, radially-cut and joined by the middle and bookmatched. Dendrochronological analysis of lutes 1596 and Undated suggest a long drying period between the felling of the tree and the construction of the soundboards.

By proportionally scaling down the digitally generated soundboard drawing of all the lutes<sup>375</sup> to the same width and superimposing them, it can be established that, with the exception of the rosette of lute 1596 which is slightly smaller and positioned lower within the soundboard, the position and proportional radius of the rosettes is roughly the same in all cases (*Figure 157*). The consistency in size and position of the soundhole can be interpreted as an intentional design trait by Rauwolf, which indicates that the upper end of the rosette is placed in relation to the bottom end of the soundboard.

The geometric pattern of the rosettes of Rauwolf's extant lutes is different in all cases, with the exception of lutes 1593 and 1598 which share the same basic pattern. The rosette on lute 1598 encompasses a larger portion of the pattern, though the difference in size is not equal to the proportion of the omitted section of the pattern. That is, although the rosette on lute 1598 is larger in diameter,<sup>376</sup> the pattern of the rosette is smaller. In fact, for the difference in size to be the motive for shortening the pattern, the rosette on lute 1593 should be only 73mm in diameter (*Figure 158*). In addition, the rosette in lute 1593 has internal parallel grooves carved out within the pattern, whilst the one in lute 1598 does not. This evidence suggests that although the rosettes share the same

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<sup>375</sup> Since the soundboard of lute 1612 is not original, it was not part of this comparison.

<sup>376</sup> The diameter of the rosette on lute 1593 is ca.104mm and on lute 1598 is ca.108mm.

pattern, they were drawn independently rather than using the same printing block or a pre-cut template.

Lute 1577  
Lute 1598  
Lute 1593  
Lute 1596  
Lute Undated



Figure 157. Diagram of the position and proportion of the rosettes.

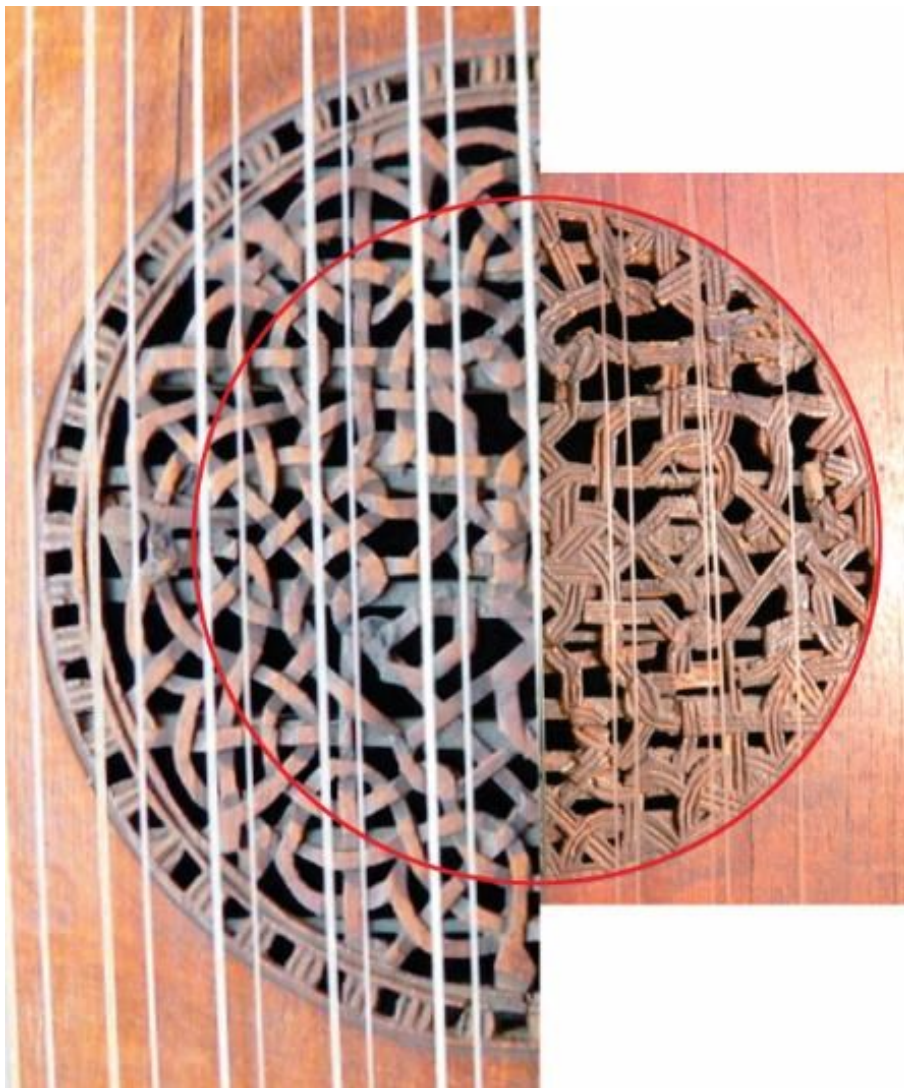
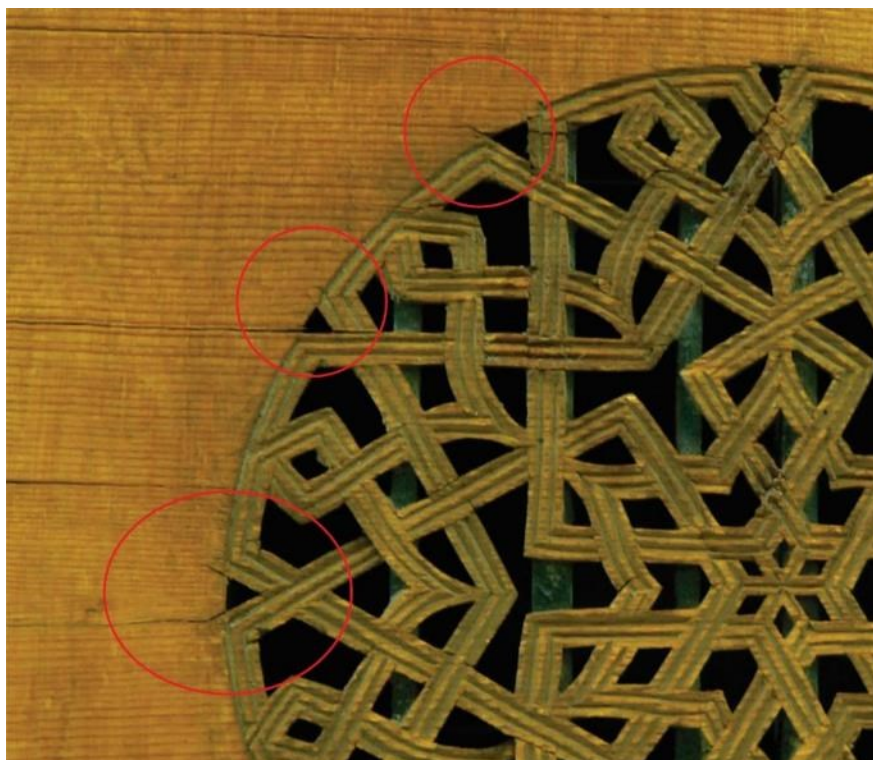


Figure 158. Detail of the pattern of the rosettes on lutes 1598 (left) and 1593 (right). The red circle indicates the perimeter of the pattern of rosete of lute 1593.

A close examination of the rosette carved on the soundboard of the 1596 lute provides clues to a plausible technique used by Rauwolf to carve the rosette. A number of the cuts made by the knife whilst carving the pattern continue beyond the outline of the circle delimitating the edge of the rosette (*Figure 159*). These small traces provide clear evidence that the carving took place from the outside of the soundboard.





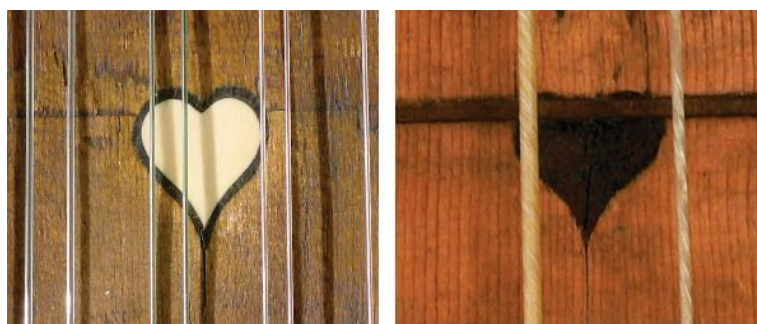
*Figure 159* Detail of the rosette of 1596 lute. Circled in red are the traces of cuts made from the outside of the soundboard. Photo by Jonathan Santa Maria Bouquet, 2006.

None of the bridges currently present on the studied instruments is original. Observation under ultraviolet to find traces of glue to determine the original position of the bridge was unsuccessful in most cases, with exception of lute 1612 in which the outline of a previous bridge is quite evident on the soundboard, and lute 1589 in which we can see the outline of a bridge of similar size and shape but a few millimetres lower on the soundboard. In all other cases the possibility that the replacement bridges were glued at the same location – albeit not of the same dimensions – as the original is confirmed by comparing the location of the bridges using the drawn digital versions of the lutes (*Figure 157*).

Four of the studied lutes have decorative inlays on the soundboard; one of them obviously decorated for a specific customer,<sup>377</sup> and the other three present ornamental elements which can be considered characteristic albeit not exclusive of Rauwolf's work: a spade-shape inlay in correspondence with the centre line at the bottom end of the soundboard, formed by an upside-down heart-shape and small triangular inlays made of ivory or mother of pearl, surrounded by a dark wood binding (*Figure 160*); and in two of these three instruments a heart-shaped inlay at the upper end of the soundboard between the fingerboard points (*Figure 161*).



*Figure 160. Detail of the spade-shape inlay on the soundboard of lutes 1593, 1596, and 1598 (left to right).*



*Figure 161. Detail of the heart-shape inlay on the soundboard of lutes 1593 and 1596.*

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<sup>377</sup> Lute 1577, which has bespoke inlays and a rosette with decorative elements related to the Fugger family (*Figure 74*).



Although all of Rauwolf's lutes have decorative fingerboard points, the numerous modifications to which all of them were submitted, including the replacement of the neck, makes them invalid for this study.

Three of Rauwolf's lutes (1577, 1593, and 1596) have very similar strap-buttons inserted to the centre rib of the back, although there is no consensus as to the date in which strap-buttons were first employed for lute playing, and their presence in iconography is hard to ascertain. One entry in the Fugger inventory<sup>378</sup> describes "One old lute with a green strap",<sup>379</sup> which according to Smith can be interpreted as a green "lace or binding around the edge of the belly, but it seems unlikely that this would have been coloured green".<sup>380</sup> Contrary to this assertion, there is iconographic evidence of coloured binding around the soundboard, as described (*Figure 162*).

Certainly the use of straps and therefore strap buttons was a common feature by 1637, when Mersenne describes their use as:

The lute, leaned against a table or another body, must be supported by the weight of the right arm, although one can hold it without this prop by means of two small buttons of ebony or ivory'.<sup>381</sup>

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<sup>378</sup> Entry number 31 of the inventory.

<sup>379</sup> Richard Schaal, "Die Musikinstrumenten-Sammlung Von Raimund Fugger D. J." *Archiv Für Musikwissenschaft* 21, no. 3/4 (1964), 214. The original text is: "1 alte Lautten Mit einem grienen Bortten", which according to Smith can be interpreted as a green lace or binding around the edge of the belly, but it seems unlikely that this would have been coloured green.

<sup>380</sup> Smith, 325.

<sup>381</sup> Mersenne, 77. (Translation by R. E. Chapman, The Hague, 1957, p. 105.)



Figure 162. Seven-course lute with red binding. *The Merry Lute Player*, Frans Hals, c.1624–1628. Oil on canvas Guildhall Art Gallery (Photo credit: City of London Corporation).



Figure 163. Strap buttons of lutes 1577, 1593, and 1596.

## Chapter 5: Reconstructing a Rauwolf lute

The lute built for this project was not the reconstruction of a specific instrument but an amalgamation of the information found through the cross examination of Rauwolf's lutes, and the historical evidence found in original sources. This archetypical lute was, however, mostly based on lutes 1593 and 1596, since both are built on the same model and share a number of characteristics and dimensions.

The shape and outline of the body are based on that of lute 1596 since it is the better preserved of Rauwolf's 'Round model' lutes, of which there are more extant examples. Nonetheless, the back was made of twenty-seven ribs of *lignum vitae* based on lute 1593.

The size of the rosette, its pattern, and position within the soundboard are based on that of lute 1593, because unlike the one on lute 1596, it is proportionally consistent with the majority of the instruments by Rauwolf.

The string configuration was set as eight double-courses, based both in historical evidence gathered throughout this research, and on the two Rauwolf lutes mentioned in the inventory of the *Stuttgarter Hofkapelle*,<sup>254</sup> both described as having sixteen strings. Even though eight double-courses is not the most common configuration, it is by no means unheard of. According to Friedemann Hellwig, a large octave bass lute by Michael Hartung (*Figure 164*), now in the Germanisches Nationalmuseum<sup>382</sup> which appears to be "still original in every detail",<sup>383</sup> has a pegbox with sixteen pegs, and a bridge with "string holes being arranged in eight double courses".<sup>384</sup> Another example of a lute with eight

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<sup>382</sup> Lute by Hartung, Germanisches National Museum, Nurnberg nr.MI56.

<sup>383</sup> Hellwig, Friedemann. "An Example of Lute Restoration." *The Galpin Society Journal* 23 (London, 1970), 67.

<sup>384</sup> Ibid.

double courses preserved in original condition is the one made by Magno Tieffenbrucker in Venice in 1609, currently part of the collection of the Museo Bardini in Florence.



Figure 164. Lute by Hartung, Germanisches National Museum, Nurnberg nr.MI56.<sup>385</sup>

Further evidence of this configuration can be found in Michele Carrara's *Regola ferma e vera per intavolare nel liuto*, where he describes an eight-course lute with all double courses and provides the tuning for each of them.

The shape, measurements and materials used for the construction of all the remaining parts will be explained in detail in this chapter.

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<sup>385</sup>[http://www.mimo-international.com/MIMO/doc/IFD/OAI\\_GNM\\_DE\\_661585/basslaute](http://www.mimo-international.com/MIMO/doc/IFD/OAI_GNM_DE_661585/basslaute)

## Drawing the plan

In order to reconstruct a lute as originally designed and made by Rauwolf, it is necessary to generate the technical drawing of a theoretical prototype of the instrument. One could argue that the creation of this technical drawing is in fact the main body of the creative process, and the reconstruction of the lute itself is the application of the theoretical information gathered from the original sources to reach a physical conclusion of the plausibility of this thesis.

There are a number of publications, both historical and recent, that have attempted to decipher or describe the geometrical construction of the lute, either as a generic model of the lute as a unique entity, or at the different stages of its history.<sup>386</sup> Applying any of the described methodologies in a literal manner will lead to the outline of a lute, but certainly none of the published methods describes the geometric model employed for the design of the lutes made by Rauwolf.

As Francois Denise points out, even if Renaissance artists and scholars “turned to craftsmen to make increasingly precise measuring instruments... there is no trace of any cooperation between scholars and instrument-makers, nor any mathematical work or theoretical treatise on the subject of instrument-making”.<sup>387</sup>

The lack of original templates, drawings, or moulds by Rauwolf, makes it nearly impossible to ascertain the specific process he used to design and conceptualize his instruments. The aim of this project is to understand a plausible thought process behind Rauwolf’s lute designs, rather than

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<sup>386</sup> Aranult De Zwolle, Marin Mersenne, Kevin Coates, Robert Lundberg, Herbert Heyde, Francois Denis, and M. Spring.

<sup>387</sup> Francois Denis, *Traité De Lutherie: The Violin and the Art of Measurement*. (France: Aladfi, 2006), 24.

deciphering the exact methodology employed to that end. To this extent we have to comprehend the possibilities and limitations of the instrument makers of the studied period. Most likely, lute makers would have used simple drawing tools (a compass, a ruler, and a straight edge) and local measuring units for the design of their instruments. O'Brien states:

Only where it is really necessary and where dictated by some rule or theoretical concept would an instrument builder use a complicated or irrational division of the local unit of measurement.<sup>388</sup>

However, it is also very likely that the lute makers were also using basic ratios and proportions (1:2, 2:3, 3:4, etc.) between the parts and sections of an instrument rather than limit the design to specific local measurement.

According to Simone Zopf:

The use of numerical proportion is documented for buildings, paintings, furniture and even cities.<sup>389</sup>

Or as Denis eloquently describes:

The measurement of an object lay in the realm of magnitude, I.e., They derived from a series of relations based on a reference dimension drawn from the object itself. The measurements of an object were an autonomous relational whole, independent to any reference to a standard.<sup>390</sup>

A thorough approach to the design of a lute should include both specific measurements and proportions.

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<sup>388</sup> Grant O'Brien,

[http://www.claviantica.com/geometry\\_files/Italian\\_geometry\\_introduction.htm](http://www.claviantica.com/geometry_files/Italian_geometry_introduction.htm) consulted on 02/01/2016.

<sup>389</sup> Simone Zopf, "A new Approach to the Design of Cremonese Violins, Using the Roman *Oncia*", *Making Wooden Musical Instruments; An Integration of Different Forms of Knowledge. Proceedings*. Edited by Marco A. Perez & Sandie Le Conte, (Barcelona, 2016), 171.

<sup>390</sup> Denis, 26.



Evidence of the use of the compass by instrument makers can be found in the portrait of Gasparo Duiffopruggar<sup>391</sup> engraved by Pierre Woeiriot. In this image, the luthier is depicted with a number of instruments and holding a compass (*Figure 166*). Often, more physical evidence of this is found on original templates like those left by Stradivari,<sup>392</sup> or inside the soundboard of some lutes, where traces of circles have been marked to determine the position of the braces or the bridge (*Figure 165*).



*Figure 165.* Detail of the inner side of a lute soundboard showing traces of the use of a compass. Lute by Joachim Tielke ca.1695, private collection. Photograph by Jonathan Santa Maria Bouquet 2010.

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<sup>391</sup> His name is often found with different spellings e.g. Kaspar Tieffenbrucker or Gaspard Duiffopruggar.

<sup>392</sup> Zopf, 171.



Figure 166 Gaspar Duiffoprugcar, Print made by Pierre Woeiriot. British Museum 1862,0208.109. © The Trustees of the British Museum.

As to which measuring unit Rauwolf was likely to have used, a conceivable possibility is that although Rauwolf was active in Augsburg, he could have used a measuring unit known to be employed by lute makers from the Leech valley working in Venice or Padua, the Venetian inch or *oncia*.

The precise conversion of this historical measuring unit to millimetres is somewhat contested. According to Robert Lundberg the 'Venetian inch' was:

The unit of measurement apparently used by early lute makers in Venice and Padua, it is about equal to 27.4mm...<sup>393</sup>

Grant O'Brien describes the Venetian measuring units as:

The Venetian foot or *piede* (plural *piedi*) had a length close to 347.76mm, and this was divided into 12 giving an inch or *uncia* of 28.98mm.<sup>394</sup>

And Herbert Heyde provides two further alternative versions, establishing the Venetian *uncia* as 28.35 (grouped with Verona and Udine) or "28.96 (approximately)".<sup>395</sup>

Another conceivable prospect is that Rauwolf used instead the common measuring unit in Augsburg at the time, the *Werkschuh*, which equates to 296.19mm,<sup>396</sup> and was divided in 12 *zoll* (24.68mm).<sup>397</sup> Heyde establishes that:

Füssen and the surrounding area to the left of the Lech valley belonged to the prince-bishopric of Augsburg from 1310 until the secularization in 1803. Consequently, the instrument makers worked according to the Augsburg's measurement system.<sup>398</sup>

The use of the Augsburg *zoll* by Rauwolf is confirmed by a geometrical analysis of lute 1596 undertaken by Simone Zopf.<sup>399</sup>

There are very few measurements of the instruments as they stand today that can be regarded as reliable, either because of the modifications and repairs

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<sup>393</sup> Lundberg, 260.

<sup>394</sup> Grant O'Brien,

[http://www.claviantica.com/geometry\\_files/Italian\\_geometry\\_introduction.htm](http://www.claviantica.com/geometry_files/Italian_geometry_introduction.htm) consulted on 11/01/2017.

<sup>395</sup> Herbert Heyde, *Musikinstrumentenbau 15. - 19. Jahrhundert Kunst - Handwerk Entwurf*, (Leipzig: VEB Deutscher Verlag für Musik, 1986), 84.

Heyde provides three different possible millimetric equivalents for the Augsburg *zoll* (296.19, 296.078, and 296.17) based in four different historical sources.

<sup>396</sup> Ibid, 74.

<sup>397</sup> Ibid, 84.

<sup>398</sup> Ibid, 74.

<sup>399</sup> This unpublished analysis was undertaken in 2016 by Simone Zopf with the collaboration of students from the Department of Lutherie of the HTBLA Hallstatt, Austria: Manuel Hrovath, Rene Schmidt and Florian Hertzsch. Zopf determines the *zoll* at 24.6725mm.

suffered by the instruments, or else because of the dimensional changes of their materials. Measurements of landmarks on the soundboard running longitudinally with the grain of the wood are somewhat more reliable than those perpendicular to the grain. This is made evident, for example, when measuring the diameter of the rosettes, which in all cases is nowadays an ellipse rather than a circle. Some measurements like the total width can be inferred by calculating the shrinkage of the wood; this method, although not completely accurate, provides a good idea of the initial dimensions of the instrument. A hypothetical version of the original outline can be digitally generated by manipulating arbitrarily the dimensions of the current outlines.

By comparing the measurements and proportions of all of Rauwolf's lutes it was possible to establish that the most fitting measuring unit to interpret the dimensions of Rauwolf's lutes is 24.46mm.

The 0.22mm discrepancy between Rauwolf's measuring unit and the Augsburg *zoll* seems inconsequential and virtually impossible to be accurately measured with the available tools of the time; nonetheless, when this minute dissimilarity is multiplied in the design of a lute, it accounts for 2.64mm per foot, resulting in significant inaccuracies when trying to construe the geometry and proportions of an instrument.

Nominally this 24.46mm unit is closer to the Freiburg *zoll* (24.44mm),<sup>400</sup> than to the one of Augsburg, but it is rather unlikely that Rauwolf would have purposely used a measuring unit from Freiburg in his designs. A more likely explanation is the consistent use of a slightly flawed ruler in his workshop to

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<sup>400</sup> Heyde, 84. According to Heyde, this measuring unit is also used in Bern and Neufchatel, in Switzerland.

design and draw his instruments. Therefore, any further reference to this particular unit will be referred as 'Rauwolf zoll', abbreviated as 'rz'.

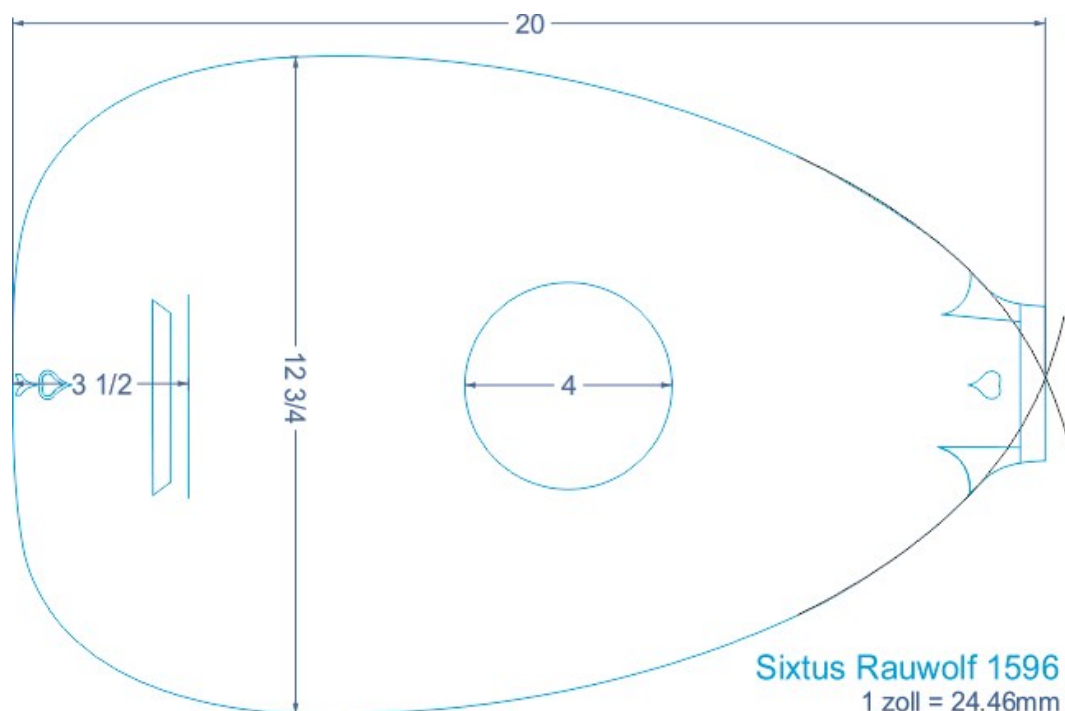


Figure 167. Lute 1596 measured in Rauwolf zoll (1zoll = 24.46mm).

There are many approaches towards the geometrical analysis of a historical musical instrument's design, and the reality is that all of them are merely speculative. The lack of a clear set of instructions or ideas left by any lute maker from the Renaissance leaves a void that modern makers, organologists, and historians have tried to understand for many decades.

The exercise of reverse-engineering a Rauwolf lute for this project was accomplished using digital technology,<sup>401</sup> nonetheless, the tools used within the software are the equivalent of the aforementioned basic drawing tools. The

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<sup>401</sup> All the described processes were done digitally using Corel Draw® X6. Design software.

whole plan was drawn using only straight lines, and curves derived from circles as drawn by a physical compass.

To define the body outline, the current outline of lute 1596 was digitally manipulated. A copy of the outline was generated and drawn mirrored with reference to the centreline. By comparing the two overlapped lines, it was confirmed that the outline is not entirely symmetrical. Assuming the original intent was to have a symmetrical outline, the new outline was defined by a compromising median between the two halves of the actual outline, favouring the outermost of the two as it is likely that a smaller line is the result of the removal of material in subsequent repairs. The width of this outline was increased to  $12\frac{3}{4}$  rz to compensate for the dimensional shrinkage of the wood.

The outline of a lute can be explained or understood as two symmetrical halves, each of them formed of a combination of curves or sections of circles. Lundberg provides a very simplistic diagram explaining the outline of the late-Renaissance instruments' construction (*Figure 168*).<sup>402</sup> Unfortunately this diagram does not correspond to any of Rauwolf's lutes.

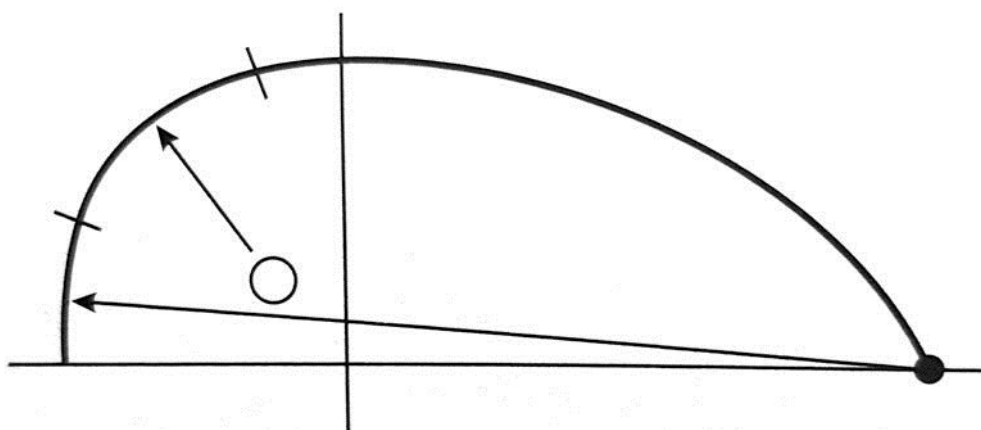


Figure 168. Diagram of the construction of the outline of a late-Renaissance lute by Robert Lundberg.

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<sup>402</sup> Lundberg, 5. This diagram has been used by other authors to define the lutes from this period. See: Smith, 69.



A reverse engineering exercise of the geometry of the outline shows how Rauwolf's lute is constructed of five distinctive sections of curves of specific radii, All of them measurable in  $rz$  (Figure 169).

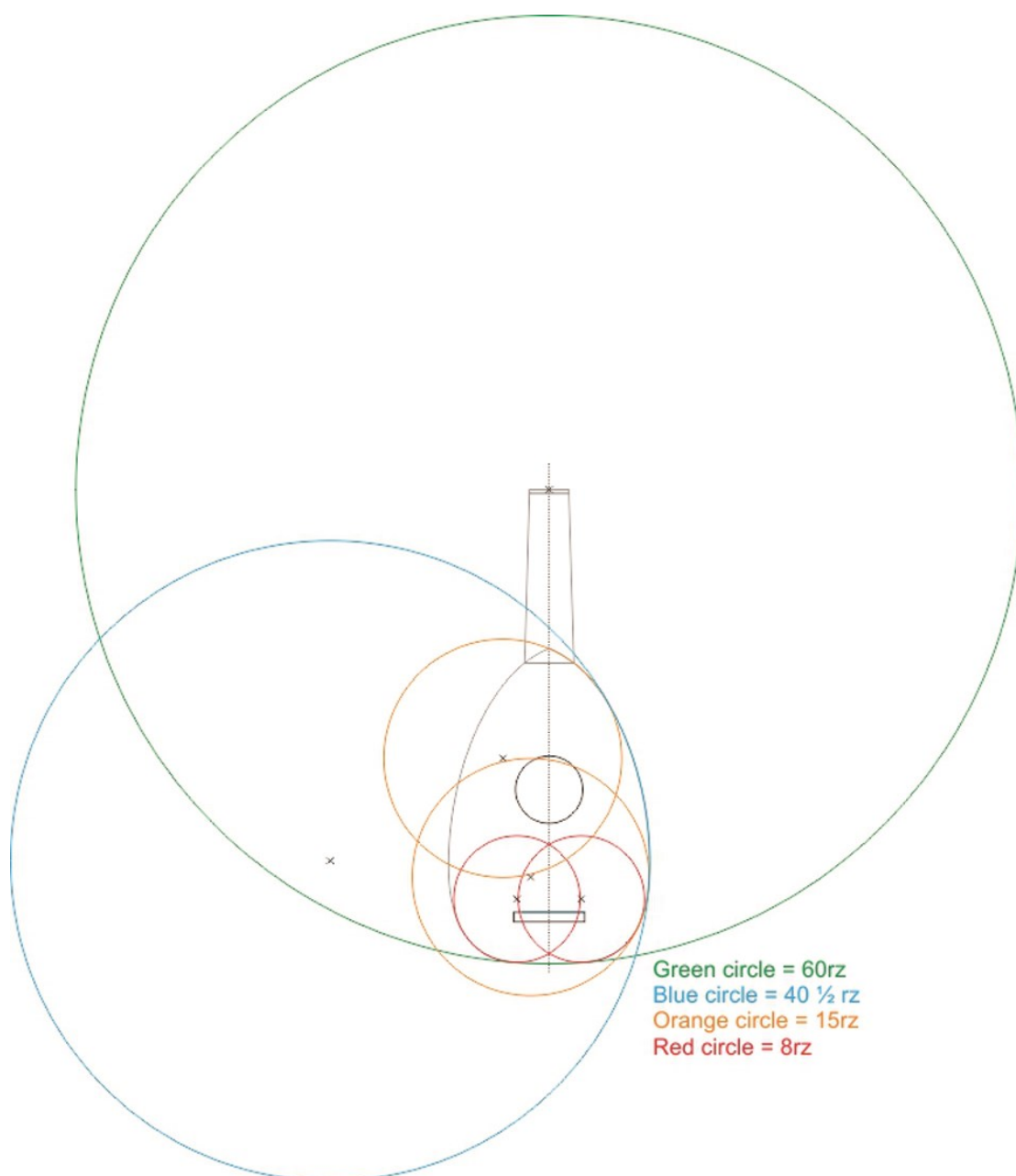


Figure 169. Diagram of the geometrical analysis of the outline.

Although it is not completely certain how Rauwolf approached the geometric construction step-by-step, a simplified version of the diagram provides a clear picture of the interrelation of the curves, their radii and the correlation of their centres.



Establishing the shape and size of all these new parts of the lute is a complex exercise. Each element, the neck, bridge, strings, and soundboard, has a direct effect on the dimensions of the others; in a sort of symbiotic circle, small variations in the proportions of any of these variables affect the proportions of all the rest. A longer neck impacts directly on the string length, which concurrently changes the angle of the strings with respect to the bridge, resulting in a wider neck at the joint with the body, and thus shortening the length of the soundboard. Similarly, the size and position of the bridge within the soundboard changes the string length and angle with the same implications.

Therefore, to define the dimensions of the neck it is necessary to first deduce a plausible string length, and in order to achieve that, it is necessary to establish the bridge position on the soundboard and its dimensions.

In his *Harmonie Universelle*, Mersenne offers a solution for such a conundrum. To determine the location of the bridge, the length of the soundboard should be divided into eight equal parts, starting at the bottom. The first two sections are “divided... into three other equal parts, the said bridge is glued upon the second part which is situated above”.<sup>403</sup>

The length of the soundboard is a somewhat contentious item, though, and there are many ways to interpret or to define where the soundboard ends: at the point where the neck meets the body, at the point at which the soundboard meets the fingerboard, at the point at which the curves of the outline of the soundboard would converge if continued to the centerline of the lute, or even at the point at which the block begins. Since all lutes by Rauwolf have had their necks replaced, the point at which the soundboard meets the neck has been lost; the continuation of a hypothetical outline curve to the centerline is uncertain, and the dimensions of the block are unknown for most of the examples. For the purposes of this study the soundboard was measured from the bottom end, to the beginning of the fingerboard as the material of the soundboard is less likely to suffer deformations in that direction and because the decorative elements and their proportions appear to be original, and the dimensions can be divided into Rauwolf zoll.

Taking this into account, the total length of the soundboard of lute 1596 is 477mm (19 ½ rz), therefore, following Mersenne’s instructions, the bridge

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<sup>403</sup> Mersenne, 78.

should be placed at 79.5mm ( $3\frac{1}{4}$  rz), which is very close to where the current bridge is located.<sup>404</sup>

Mersenne omits to specify whether this intersection should be aligned with the centreline of the bridge, its front, or its back. Nevertheless, by following his description of the dimensions of the neck:

...it must be observed that the neck... ought to be of the same length as the interval from the beginning of the sound-board to the middle of the rosette.<sup>405</sup>

The centre of the rosette of lute 1596 is 262.9mm (10.75rz) from the bottom end of the soundboard. Therefore, the length of the neck should be also 262.9. After removing the width of the nut, and assuming the length of the neck corresponds with the ninth fret, the string-length can be calculated by using the twelfth root of two method,<sup>406</sup> resulting in 648.5mm. When transferred to the soundboard, this string-length concurs with the line at 79.5mm as initially estimated. Coincidentally, by doing so, the eighth fret falls at the intersection of the centreline of the soundboard and the hypothetical junction of the two halves of the outline (*Figure 171*). Furthermore, the centre of the circle to trace the curve of the bottom of the outline (green circle of *Figure 169*) which accounts for the total length of the lute, corresponds with this string length if a nut of  $\frac{1}{4}$  rz is added.

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<sup>404</sup> The front end of the current bridge is located at 79.4mm from the end of the soundboard.

<sup>405</sup> Mersenne, 78.

<sup>406</sup> This method is used to calculate semitones in equal temperament. The string-length is divided by the twelfth root of two (an irrational number equivalent approximately to 1.059) to obtain the distance of one semitone, or fret.

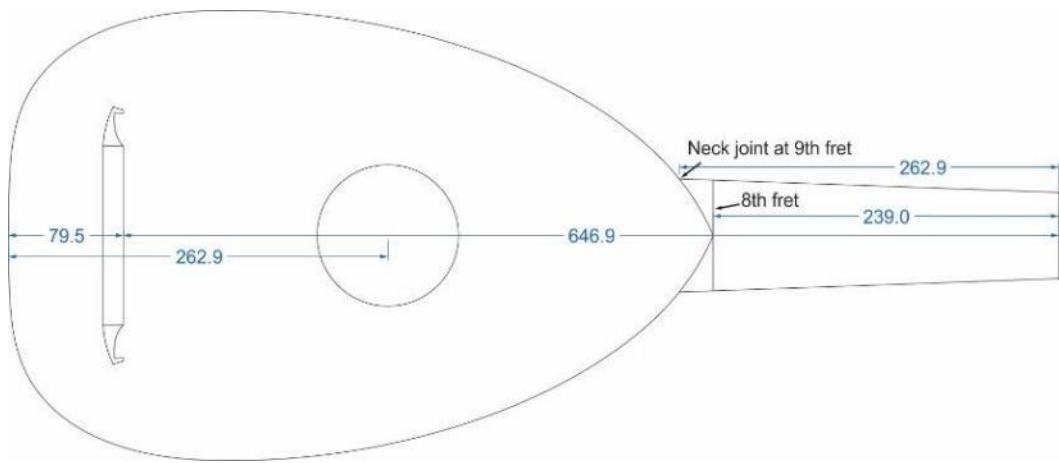


Figure 171. Diagram of the location of the bridge according to Mersenne.

Unfortunately, not all of the instructions provided by Mersenne coincide with Rauwolf's design. For example, Mersenne establishes that if the body length is divided in eight equal parts, the centre of the rosette should coincide with the fifth division. Applying this description to the dimensions of the 1596 lute: the distance from the bottom of soundboard (262.9mm) divided by five (52.58mm), equals 1/8 of the body length, therefore the length of the soundboard should be 420.64mm (52.58X8), which is considerably shorter than the actual instrument (*Figure 172*).

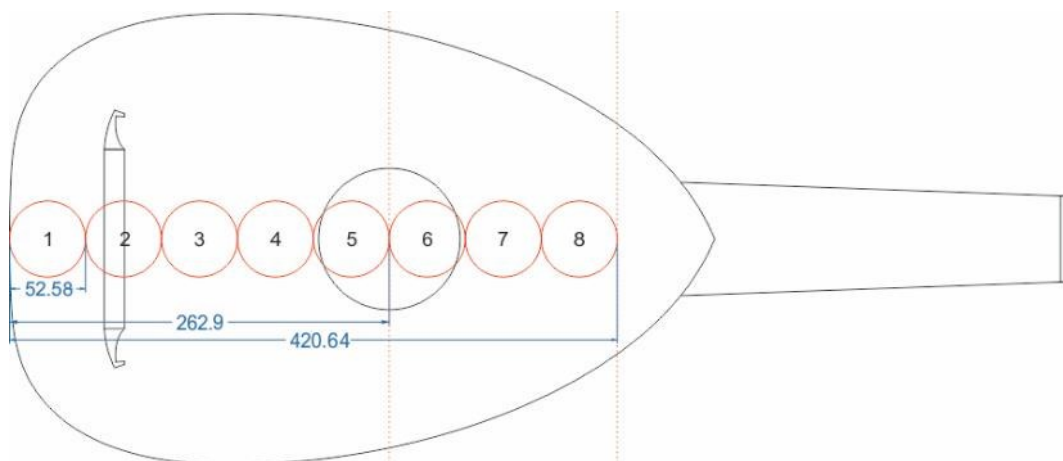


Figure 172. Diagram highlighting the discrepancy between Mersenne's subdivision of the soundboard to locate the rosette, and Rauwolf's design.

Comparing the position of the rosette of the six studied lutes, it can be established that (with the exception of that of lute 1596) all of them are proportionally in the same area (*Figure 157*); nonetheless, none of them coincides

with Mersenne's explanation. Therefore, accepting Mersenne's ideas for the position of the bridge and the length of the neck is an arbitrary decision rather than an endorsement of the accuracy of his description of the lute design. After all, Mersenne's description of the lute took place decades after the construction of these lutes, and it is unlikely that Mersenne was describing one of these specifically.

Two of the most important factors of the string-band, namely the distance between the first and the last strings both at the bridge and at the nut, are determined by ergonomics and practical implications rather than measurements and proportions. Determining these two distances will influence the width of the neck at its junction with the body.

The length of the nut is directly related to the number of courses, the distance between them, and that between the strings of each course. The distance between strings should allow for a finger to press comfortably both strings of one course together; at the same time, the space between courses should be enough to do so without stopping the neighbouring strings. Following this criterion, and keeping in mind the measuring unit used by Rauwolf, the length of the nut was established as  $2\frac{1}{2}$  rz (61.15mm), the distance between courses was set to *2linie*<sup>407</sup> (4.96mm) and the distance between strings of the same course to 1rl (2.46mm), leaving 3.5mm between the string and the edge of the fingerboard.

Similarly, the dimensions of the bridge are in part determined by the distance between the first and the last strings, which is set by the number of courses and their distribution. The spacing between the strings within a course need to be close enough to be played together but far enough apart to prevent them from

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<sup>407</sup> 1zoll = 10 *linie*. Therefore 1 Rawuolf *linie* (rl) = 2.46mm.



vibrating against each other, and the distance between courses should be ample enough to allow a finger to comfortably play each of them individually, yet close enough to be able to go swiftly from one course to the next, or to play more than one course simultaneously using other fingers as observed in iconographic sources.

Taking all this in to account and based on the analysed original lute bridges from the period, the distance between courses was set to  $4r_l$  and the distance between the strings of each of the double courses was set to  $2r_l$ . The total length of the bridge is  $7\frac{1}{4}r_z$ , the width of the string band is  $4\frac{1}{2}r_z$ , the rectangle on the top of the bridge is  $5r_z$  by  $\frac{3}{8}r_z$ , the widest part of the base is  $\frac{5}{8}r_z$  etc. (Figure 173).

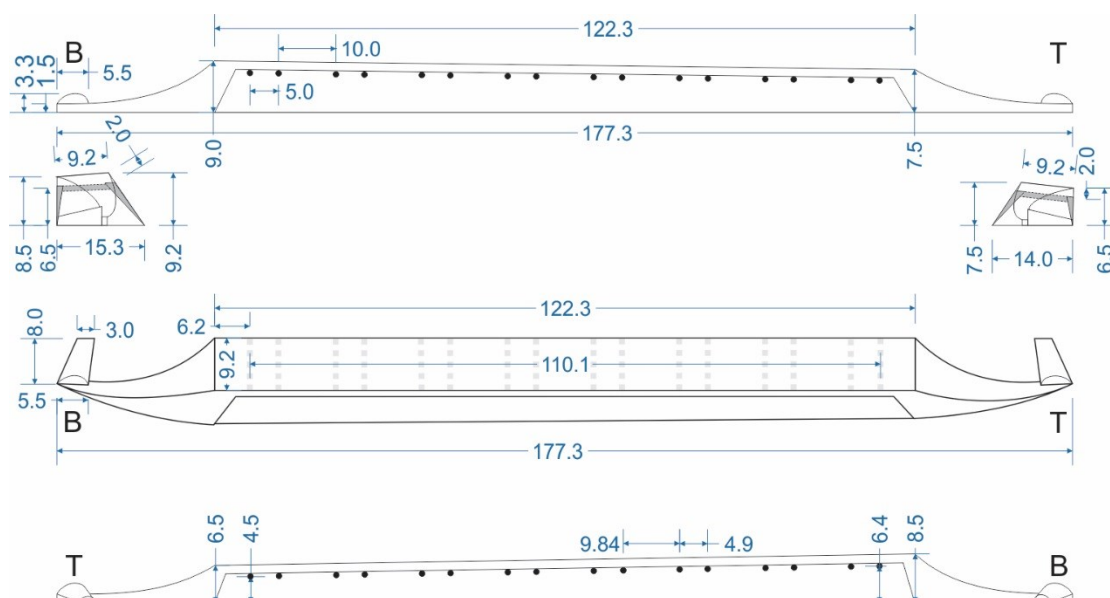
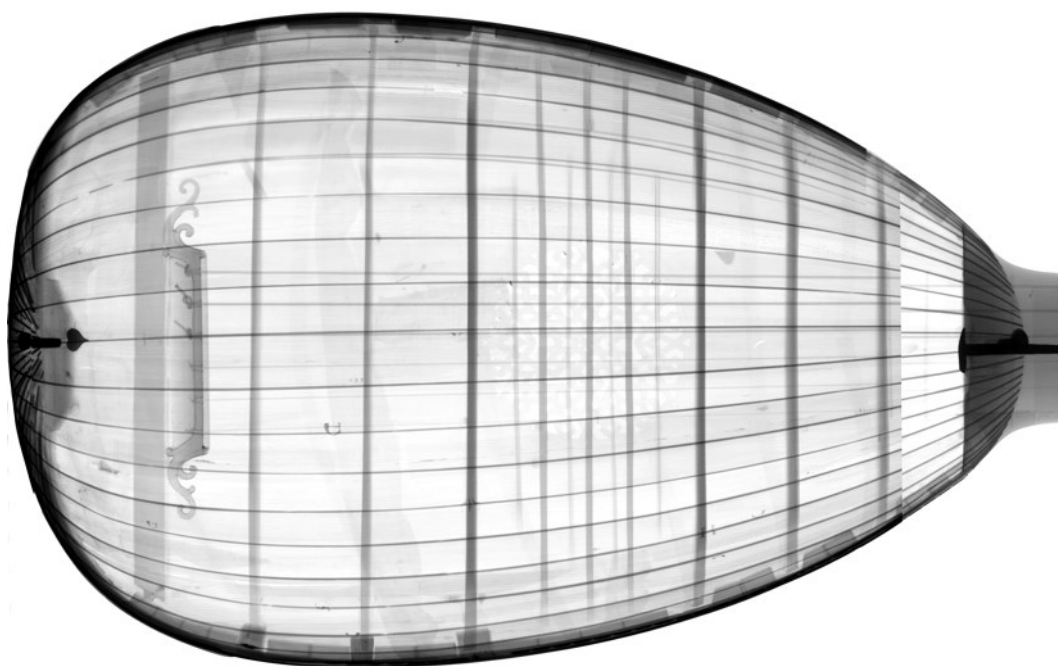


Figure 173. Diagram of the bridge (measurements in millimetres).

A comparison of the few lutes with original necks confirms that the thickness of the neck responds to an ergonomic necessity and is independent of the dimensions of the lute, since the hands of the player remain the same regardless of the played instrument. The thickness of the current neck on lute 1596 at the neck-joint is 33mm at its centreline, which could be interpreted as an original neck 30.57mm ( $1\frac{1}{4}r_z$ ) thick without the fingerboard. This measurement was

adopted for the reproduced lute, tapering down to 18.34mm ( $\frac{3}{4}$  rz) at the pegbox.

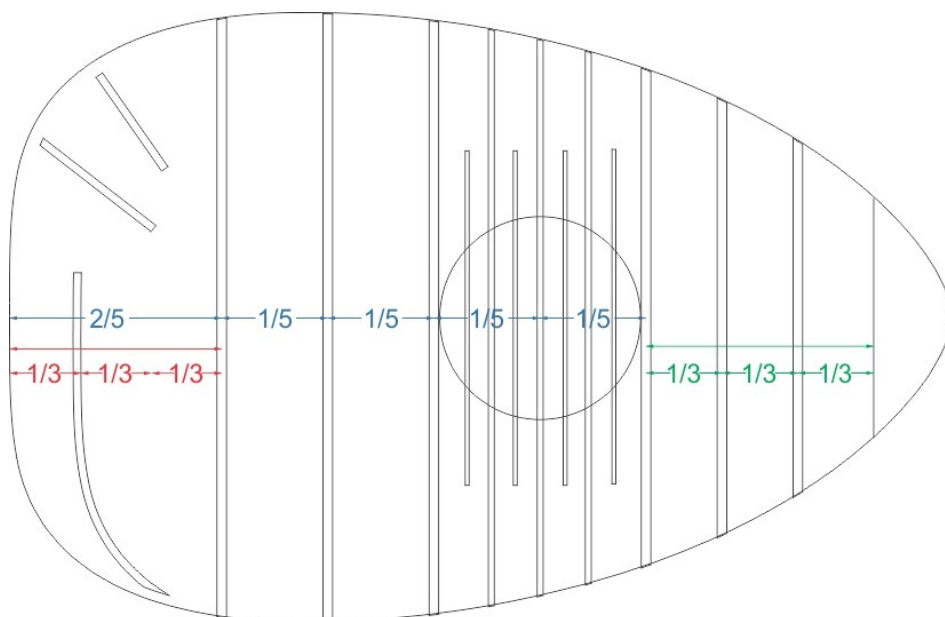
The bracing of the soundboard was based on X-ray images of lute 1596 (*Figure 174*). Rauwolf distributes the braces as follows: the section between the rosette and the bottom end of the soundboard is divided into five parts, with braces glued on the second, third, fourth, and fifth divisions, a sixth brace is positioned above the rosette equidistant to the previous braces. The space between the sixth brace and the block is divided in three parts, with two braces glued on the divisions. The brace on the fifth division, which runs on the centreline of the rosette, is narrower than the rest and it is flanked by two more braces of similar dimensions. Four further smaller braces reinforce the rosette area. The treble and bass bars under the bridge are currently missing.



*Figure 174.* X-ray image of lute 1596. Jonathan Santa Maria Bouquet, 2006.

For the reconstruction of the lute of this project, the same pattern was used, adapting it to the rosette position of lute 1593, as previously stated. The width of the braces was set to 4.9mm which is the equivalent of *2linie* in Rauwolf zoll,

and 3mm ( $\frac{1}{8}$ in) for the smaller braces under the rosette. The treble and bass bars were based on those observed on instruments of the period (*Figure 175*).



*Figure 175.* Diagram of the bracing.

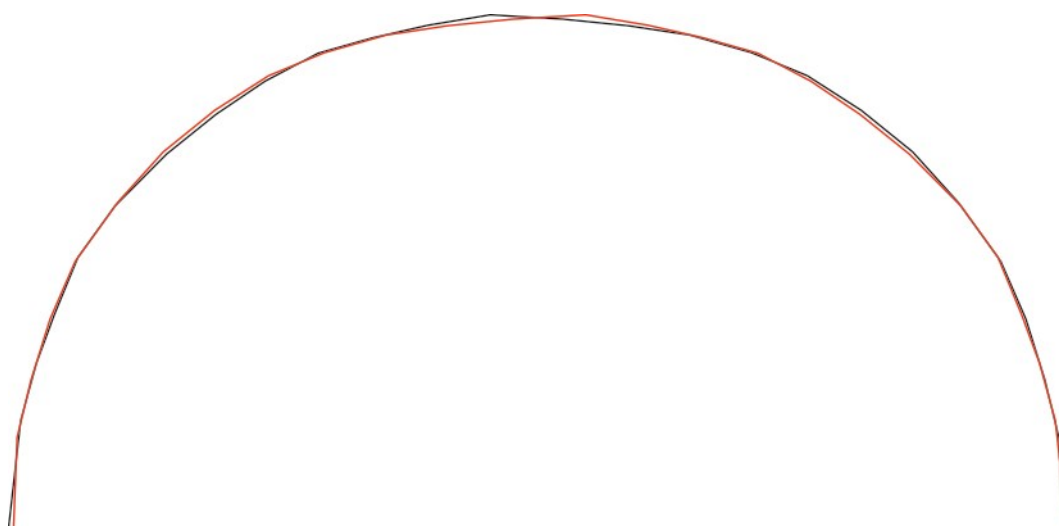


*Figure 176.* Bracing on lute Undated. Photographed by Stephen Gottlieb.

A similar bracing can be observed on the soundboard of lute Undated (*Figure 176*); although the original braces were modified and partially removed so only

the three braces above the rosette are complete,<sup>408</sup> and the ones on top of the rosette were truncated, but there is enough evidence on the soundboard to locate the remaining braces as originally built by Rauwolf.

To obtain a plausible version of an unmodified and undistorted cross section, the digital cross sections of the original instrument were manipulated digitally starting with the wider cross section taken at the highest point of the body. Each of the cross sections was copied and mirrored to compare its shape (*Figure 177*). A regular and symmetric curve was traced overarching the cross section as a plausible organic arc close to the one currently formed by the ribs. This process was repeated with all the documented cross sections.



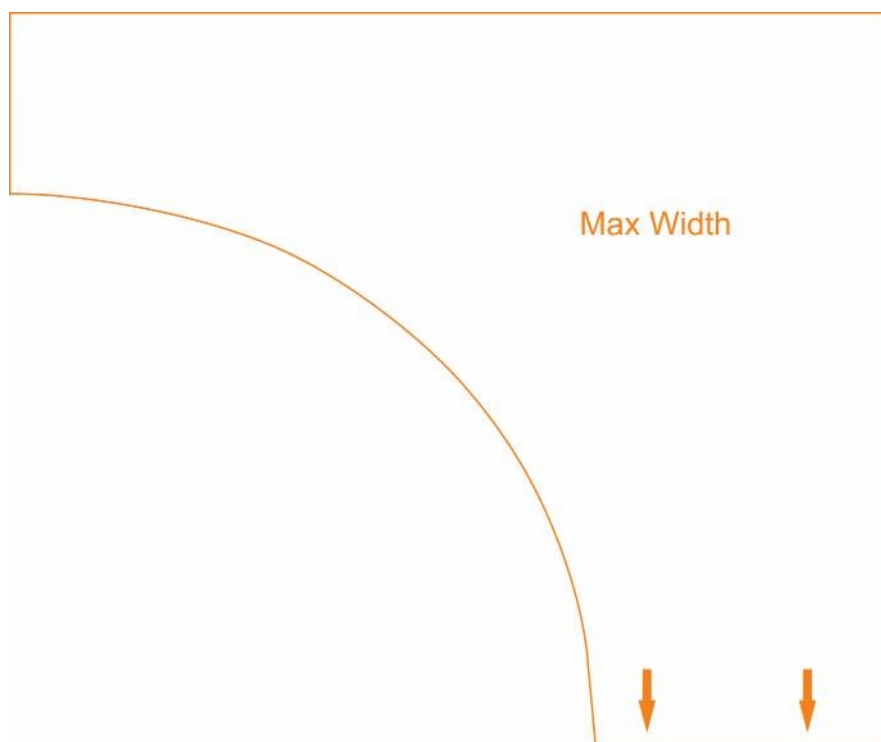
*Figure 177.* Cross section at the widest point (black), with its mirrored line (red) superimposed.

Three of the cross sections were selected to create templates for the construction of the mould: one at the widest point, one at the end of the upper block, and one between the former two. The outline of the templates was drawn by creating a parallel line 1.5mm from the drawn arching line, to account for the thickness of the ribs. Each template consisted of only one half of the arch, and

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<sup>408</sup> According to Michael Lowe they were re-shaped in the eighteenth century. Lowe, *Lute News* 83, 10.

included a flat base at 90° from the virtual median line of the body, to ensure precision whilst carving the mould (*Figure 178*).



*Figure 178.* Template of the mould at its widest point. (Scaled down 50% in this image).

The longitudinal section was copied from the technical drawing of the 1596 lute. Only the protuberance near the end of the block section (probably the result of centuries of string tension) was corrected by smoothing the original line. This was achieved on the digital drawing by placing a node in the vicinity of the deformed area and pushing back one side, emulating what would happen if the neck was moved back, thus modifying the curve organically.

Due to the lack of an original pegbox, the design for its reconstruction was based on the basic trapeze shape commonly found in iconography. In order to reach some degree of authenticity and coherence with the rest of the instrument, all of its dimensions were based on Rauwolf zoll. It was paramount to leave enough space between the pegs to allow for a comfortable tuning.

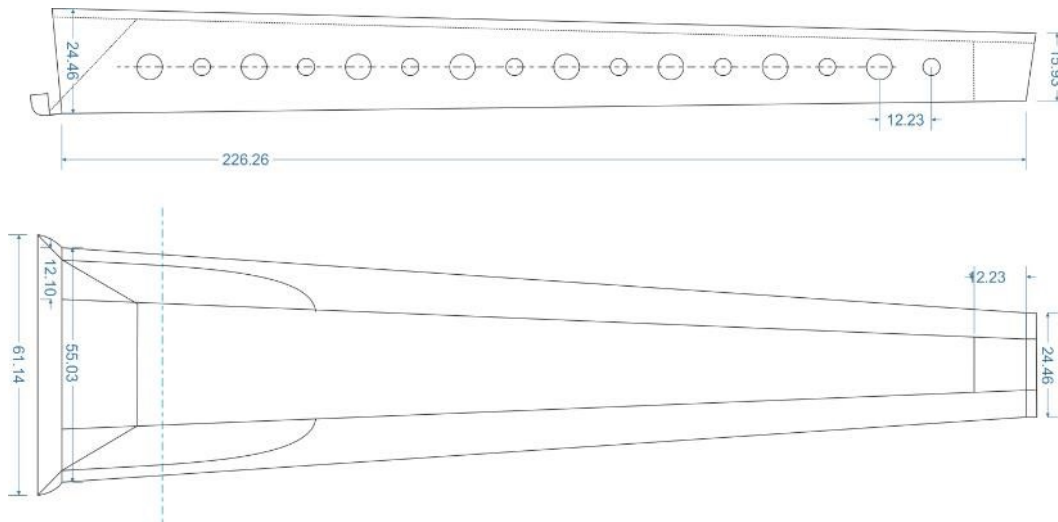


Figure 179. Diagram of the design of the pegbox in Rauwolf zoll (measurements shown in mm).

Once all the parts of the lute were drawn at 1:1 scale, a full size technical drawing was created.<sup>409</sup>

### Making the lute

The objective of this section of the project is to describe step-by-step the realization of the projected instrument from the theoretical to the physical form based on the ideas, dimensions, and proportions proposed during the creation of the technical drawing.

It is important to reiterate that the scope of this project is to reconstruct the lute itself and not the techniques or tools originally used by Rauwolf. Most of the tools employed for this project are in essence modern versions of the ones most likely used by lute makers of the sixteenth century, with the exception of a few electric machines that were employed to expedite specific tasks. Nonetheless, the machines used are not completely different from the ones available at the

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<sup>409</sup> Full-size technical drawing included as a PDF file in a DVD inside a sleeve attached to the inside back cover.



time, apart from the obvious use of an electrical motor or an electric resistance to produce heat.

Another argument can be made around the choice of materials, their sourcing, and processing before they were acquired. Once more, the intention of this project is not to reproduce the exact methods by which the materials were acquired or even processed by Rauwolf, but rather to obtain a final instrument that will be comparable to those designed and manufactured by him.

### The Back

Sculpting the mould is in a certain way the most important part in the construction of a lute, the accuracy (or the lack of it) of the finished mould will be directly reflected in the produced instrument. Once the mould is produced, it can be re-used to build potentially an unlimited number of lutes of the same 'model'. The similarities of shape and dimensions between lutes 1596 and 1593 can be interpreted as evidence of the use of a single mould to produce slightly different instruments. The different number of ribs of these two examples indicates that such a mould had to be a solid and rounded rather than faceted, which would constrain the number of ribs that create the back. Further evidence of the use of a round solid mould is the difference in width of the outermost ribs of lute 1596, which are most likely the result of the accumulation of small errors whilst joining the ribs in the mould, adding several millimetres to the last rib. This would not happen whilst building the back on a faceted mould, thus delimitating the precise width of each rib.

For the construction of the mould, a series of templates (one of the longitudinal section and three of the transversal sections) were produced to ensure the sculpting of the mould matched the desired shape. Each template was printed, transferred to an acrylic sheet and cut out to shape, keeping the lower side of the template at a 90° angle to the centreline of the body. This flat side was used so the desired curve could be confirmed by placing the template on top of the

mould during the carving process until the curve matched the template whilst resting on a flat surface.

The solid mould was made out of yellow poplar (*Liriodendron tulipifera*) wood, which has a straight, uniform grain, with a medium texture, making it very easy to work. For the construction of the mould, a 2" thick board<sup>410</sup> was cut into sections that were glued together using an aliphatic-resin glue.<sup>411</sup> The base section was cut and finished to match the outline of the soundboard without the thickness of the ribs and missing the section that will be occupied by the block. Eight further segments shaped roughly following the longitudinal outline of the back (all of them without the block) were glued perpendicularly to the top of the main outline section, starting with two full-size sections in the centre and additional sections decreasing in size towards both ends.

The shape of the mould was carved out using only hand-tools. First the centreline of the longitudinal section was shaped. Then the rest of the body was carved out, first using spokeshaves and gouges for the initial rough-out, and once the mould was close to the desired shape and dimensions, using rasps and spokeshaves for the fine carving. For this last stage, the shape of the mould was constantly checked against the templates until all the sections matched precisely.

The flat surface or 'base' of the mould (the side where the soundboard will be on the finished lute) was carved out following a longitudinal parabola starting from the bottom and reaching its deepest point of about 3mm at the centre of the rosette. This was done to match the eventual curvature that the soundboard will have in order to obtain an appropriate action for the strings. Once this

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<sup>410</sup> Generously provided by Mr. John Raymond.

<sup>411</sup> Titebond Original® Franklin International.

curvature was properly set, the centreline of the body was scribed on the mould with a marking knife.

Once the mould was finished and sanded to obtain a smooth surface, it was coated with a commercial varnish to act as a sealer. This coating will protect the mould from the elements, avoiding drastic dimensional changes, whilst preventing the ribs and spacers from getting glued to the mould during the assembly process.

To make the block, a solid piece of spruce was roughly cut to the desired dimensions using the upper section of the templates for the longitudinal section and the outline of the mould for the sides. This was glued to the flat surface of the mould by applying only a couple of dollops of water-soluble adhesive and left to dry (*Figure 180*). The block was carved out to the desired shape using chisels, gouges, and spokeshaves, and finished with a rasp and files until it matched precisely the curve of the templates. The flat top of the block was planed down flush with the mould, and the scribed centreline of the mould extended to the block with the marking knife.



*Figure 180.* Gluing the blank of wood for the block to the mould.

A series of longitudinal lines was traced to indicate the ribs on the mould. Then a line was traced departing from the centreline of the bottom and joining the marked points to end at the centreline of the block.

Like in the original instrument, the ribs were made of *lignum vitae* (*Guaiacum Officinale*). This material was obtained from a specialized supplier of wood for musical instruments in Italy.<sup>412</sup> Lignum Vitae is one of the hardest and heaviest known woods. The heartwood colour is dark greenish-brown, the grain heavily interlocked and irregular and the texture fine and uniform. Its weight varies from 1150-1300 kg/m<sup>3</sup> with a specific gravity of 1.23.

The ribs were sourced from a single blank of wood approximately 800mm long by 100mm wide by 100mm thick. First the blank was quarter-sawn into slabs approximately 3mm thick. Each slab was planed and smoothed out using a sharp scraper blade to achieve a thickness of 1.4mm.

Once the uniform thickness of 1.4mm was achieved,<sup>413</sup> each of the slabs was divided into three equal parts lengthwise, so each slab was used to make three ribs of the back. In addition to maximising the use of the available wood, this system resulted in an aesthetically pleasing effect once the back was finished.

The ribs were bent to shape using an electrical bending-iron<sup>414</sup> set to 200°C and following the curve of the longitudinal section of the instrument.

The spacers in the original lute are made of 1mm thick stripes of ivory. Due to the current restrictions, unavailability, and ethical issues associated with the use of elephant ivory, it was decided not to use it for the spacers of the

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<sup>412</sup>Rivolta s.n.c. di Andrea Rivolta & c. | Via Vittorio Veneto 7 | 20033 Desio (Milano) Italy.

<sup>413</sup> This was measured using a Käfer Calliper, Pin-Head Type D. with an accuracy of 0.1mm.

<sup>414</sup> Stewart MacDonald Bending Iron #4049 International model.

reconstructed instrument. Several samples of different materials were tested to determine the best substitute for the reconstruction. The desired characteristics to be determined by the test were: aesthetical resemblance to ivory, adherence to water-soluble adhesive, ease to source, and workability.

Each test sample consisted of two pieces of lignum vitae of 150mm by 25mm, planed to the same thickness as the intended ribs (1.4mm) with the sides planed straight on a 90° angle to the front and back, and glued to a sample spacer 1mm thick. The three pieces were first glued using a water-soluble protein-based adhesive<sup>415</sup> and left to dry for 6 hours. After that they were submitted to a stress test to confirm the adherence. The samples that failed this test were re-tested using different adhesives, including casein, cyanoacrylate, and ethylene-vinyl acetate (EVA).

Once glued, the samples were also planed and finished with a scraper to attest their aesthetical appearance and resemblance to the original instrument. Finally a bending test was carried out to verify the suitability of the material as spacers for the lute.

The tested materials were as follows:

- Mammoth ivory - Problematic sourcing even though its commercialization is legal at the present time. The acquired samples did not meet the standards of colour (samples were significantly darker than elephant ivory), the large pieces were prohibitively costly. The spacers in the original instrument are made of very long thin pieces of ivory;

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<sup>415</sup> Hide glue diluted in water and heated in a glue pot that basically acts as a bain-marie. The glue was kept between 60° and 80°C to achieve the best adhesion results. All the pieces of the lute were glued using the same adhesive unless otherwise indicated.

unfortunately a supplier that would provide mammoth ivory in pieces of the appropriate dimensions and characteristics couldn't be found.

- Bone – Contrary to the long pieces of ivory obtainable from elephant tusks, there are no animal bones long enough to make the spacers in a single piece. As with the mammoth ivory, a supplier that could provide pieces of bone with the specific dimension and characteristics couldn't be found. Even if using several short pieces of bone per spacer, the porous nature of the material resulted in sawdust clogging the pores, creating an unsatisfactory effect. In addition, bending bone to follow the curve of the back proved to be significantly more difficult than bending ivory.
- Synthetic ivory commercially known as Erinoid or *Galalith* (from the Greek *gala*=Milk & *lithos* Stone) – This material is a synthetic plastic material developed at the end of the nineteenth century and patented in 1906. It is produced by the interaction of casein (milk) and formaldehyde. Because of its hardness and aesthetical properties, this material appeared to be suitable for the spacers. Unfortunately I was unable to find a supplier that would provide the material in a usable format for the specific dimensions needed. Another problem encountered during testing was its inability to be glued with water soluble adhesives.
- Ivoroid (Celluloid, Nitrocellulose, or Cellulose Nitrate) – From an aesthetic viewpoint this material is a very good substitute for ivory. Similarly to Galalith, this material presented problems of adhesion to the wood in the test samples. In addition, this is a hazardous material; as it decomposes at a relatively low temperature, celluloid nitrate produces toxic and flammable gases like oxides of nitrogen, hydrogen cyanide, and carbon monoxide. Partially decomposed material may detonate or auto-ignite.



- Sycamore wood (*Acer pseudoplatanus*) – Easy to source and to work to desired dimensions and shape. Unfortunately, because of its inherent golden colour and figured grain this wood was not aesthetically suitable.
- Holly wood (*Ilex aquifolium*) – This wood is widely available, it has a very uniform, pale white colour with virtually no visible grain pattern, producing an aesthetically pleasing effect in contrast to the lignum vitae. It is easily worked to the desired dimensions and it bends to shape without problems. The test samples confirmed that the water based adhesives provided a strong bond of the holly spacer with the ribs.

As a result of these sample tests, the material selected for the spacers was holly wood. Blank pieces pre-processed for guitar binding (1mm thick by 2.5mm wide and 700mm long) were sourced from a specialized wood supplier.<sup>416</sup> Each of the blank spacers was bent to shape using a bending iron set at 180°C.

The construction of the back of the lute started with the centre rib and then additional ribs were added to each side until the 27 ribs were assembled. To achieve this, each rib was first roughly cut to follow the shape provided by the lines traced on the mould and then planed down using a large low-angle jointer plane.

The centre rib was adjusted to precisely match the inner edge of the lines drawn in the mould. The centre rib was glued to the block and clamped down in place with push-pins inserted in the block (*Figure 181*). The back of the rib was secured to the mould with a small nail. A small perforation (1mm in diameter) was drilled into the rib to avoid it splitting with the grain upon the forcing of the nail.

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<sup>416</sup> Rivolta s.n.c. di Andrea Rivolta & c.



*Figure 181. Mould with the block and the centre rib glued in place.*

The subsequent ribs, one added to each side at a time, were adjusted to match the previous rib on its respective side. Due to the very small gluing surface between ribs, it was paramount to achieve a very precise joint to avoid any tension or potential detaching of the parts. To prepare the joints, a new rib was presented to one side of the previously glued one and then adjusted by removing material with a sharp planer and a file until a precise join was achieved. Once the joint was satisfactory the other side was planed down to match the inner edge of the drawn line of the mould, and a spacer was glued to the rib. Each spacer was glued to the rib and clamped by wrapping a cotton thread around the rib and the spacer to cover their entire length with a distance of approximately 10mm between each turn of the thread. Once the glue was dry, the excess height of the spacer was trimmed flush with the inner face of the rib using a sharp scraper blade. The edges of the spacers on the outer face of the ribs were left protruding slightly for future adjustment.

Each subsequent rib was glued to the previous one and clamped with pressure-sensitive adhesive tape,<sup>417</sup> and to the block using push-pins as described with the first rib. To add some pressure to the joint a number of push-pins were inserted into the mould with the shaft pressing against the other side of the new rib.



Figure 182. Gluing the ribs of the back.

This process was repeated until all the ribs were glued together forming the back of the lute (Figure 183). The last two ribs were left slightly wider than all the rest to allow for adjusting the action further down the construction process.

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<sup>417</sup> (3M™ Scotch® Automotive Masking Tape 2328, 24mm) A similar system is described by Henri Arnaut de Zwolle in the fifteenth century. Arnaut suggest the use of strips of paper previously prepared with one side coated with hide glue and left to dry. To apply them to the wood they should get damp, and then be fastened in place with a hot iron.



Figure 183. Mould with all the ribs glued.

The clasp was manufactured out of another piece of the same wood as the ribs; it was processed in a similar manner but thinned down to 1mm. The outline of the clasp was marked and cut out using a template; the contour of the template was made 1mm smaller than the projected finished clasp to account for the thickness of the binding that will surround the clasp as in the original instrument. A binding strip made of the same material and thickness as the spacers was glued to the outline of the clasp whilst still flat (*Figure 184*). As in the original instrument, the joints of the different sections of this decorative binding are butt-joints. To match the narrow curve of the clasp's ornamental



ends, the curved sections were bent using a soldering iron<sup>418</sup> set to a temperature of 200°C.



Figure 184. Gluing the binding to the clasp.

Once glued and dried, the height of the binding was planed flush to the thickness of the clasp. In preparation for gluing the clasp to the body, the bottom of the back was scraped down to create a smooth and flat surface. The centreline of the clasp and the centre rib were marked with a pencil to ensure a proper alignment, and a dry run of the gluing process was carried out to verify proper contact with the back in its entire surface, particularly making sure the ends were flat against the sides of the back.

Once full contact was obtained, the clamps from the middle to one of the ends of the clasp were removed, leaving the clamps of the other half in place to ensure its positioning would not shift during the gluing process. Once the first half was glued and clamped in place, the operation was repeated with the other half (*Figure 185*).

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<sup>418</sup> Weller Whs40 Temp Controlled Solder Iron.



*Figure 185. Gluing the clasp.*

The counter-cap, which is an internal reinforcement that acts as a lower block to increase the gluing surface of the soundboard, was made out of radial-cut spruce. The blank piece of wood was 30mm wide by 500mm, planed down to a thickness of 4mm at its centre and decreasing in thickness lengthwise towards its ends to 3mm. Due to the thickness of this piece of wood, it was soaked in a solution of water and acetic acid<sup>419</sup> for 2 hours to facilitate its bending process. The introduced moisture produces steam whilst in contact with the bending iron, allowing an easier bending and preventing the wood from burning at the same time.

Once the curve of the counter-cap matched closely the inner curve of the bottom of the back, it was trimmed to the right length, glued, and left to dry overnight. Later on both ends of the counter-cap were chamfered.

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<sup>419</sup> Distilled white vinegar.



The joints between the ribs were reinforced from the inside with 6mm wide strips of handmade 100% linen paper glued following the entire length of the ribs from the upper block to the counter-cap, and the maker's label was glued to the back.



Figure 186. Finished back showing the lining paper and the maker's label.

To prevent the back from suffering any deformation whilst waiting for its assembly with the soundboard, a 'false soundboard' was made following the description of Mersenne:

...a false sounding-board is placed inside the body of the lute to hold it in place, so as to apply it upon a board completely straight, and to erect it in such a way that it will not warp at all.<sup>420</sup>

This was made with plywood 1/4' thick, properly fitted, and glued to the inner walls of the ribs using only a few drops of adhesive to allow its easy removal further down the construction process (Figure 187).

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<sup>420</sup> Mersenne, 78.



Figure 187. Back with the 'false soundboard'.

### The Soundboard

According to the description in the dendrochronological analysis carried out on two of Rauwolf's lutes, the wood employed for the construction of the soundboards was European spruce (*Picea abies*) grown in the alpine region. Consequently, the wood for the soundboard of the reconstruction was European spruce sourced from a company specializing in tonewood.<sup>421</sup> This small company endeavours to source the wood combining traditional techniques with a sensible level of mechanization, completing all the production steps from the standing tree to the finished product.

The cold climate of the Alpine region causes the trees to have a short growing season. This, combined with the regularity of the seasons year after year, results in spruce trees with tight and regular annual ring growth, ideal for the construction of soundboards for musical instruments. The wood from this supplier is sourced from trees grown at an altitude between 1300 and 2000

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<sup>421</sup> Florinett AG, Tonewood Switzerland. Veja Megstra 133, CH-7482 Bergün.

meters and with an average diameter of at least 45cm, having reached an age of 200 to 250 years.<sup>422</sup>

The soundboard was made of two bookmatched sections jointed by the middle. The outer surface was planed flat and finished with a sharp scraper-blade. The inner surface was initially planed down to reach a thickness of 2mm using a low-angle plane to avoid tearing the spruce.

The centre of the rosette was located following the drawing and marked with a sharp awl. A circle of 120mm in diameter was traced with a compass from the centre, and the thickness within this circumference was decreased following a constant chamfer to reach a 105mm circle with a regular thickness of 1mm.

A circular paper reinforcement 120mm diameter was glued to the inside of the soundboard in correspondence with the thinned out area, and a second layer of paper, this one with the rosette pattern printed out, was glued at the same spot on the outer surface of the soundboard, making sure the orientation of the pattern followed the centreline of the soundboard. Contrary to the traditional block printing used in the sixteenth century, the rosette was digitally drawn<sup>423</sup> and printed in regular white 80g/m<sup>2</sup> Bond paper. In order to avoid any deformations caused by the introduction of moisture in the adhesive, the soundboard was left to dry overnight flattened by a board topped with weights.

To carve the rosette, first the outline of the cut-out sections was defined by cutting straight lines following the printed pattern of the pre-glued paper with a knife fitted with a 32.5° cutting angle and 0.45mm thick blades. The sharpness

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<sup>422</sup> <http://www.tonewood.ch/fromtreetosoundboard.html> consulted on 29/02/2016.

<sup>423</sup> Using Corel Draw®.

of the blade of this knife is paramount to achieve precise cuts and avoid compression of the wood or eventual tears when cutting against the grain.<sup>424</sup> In addition, the blade was often lubricated by pushing it into a bar of soap; this allows the blade to run smoothly whilst cutting the spruce of the soundboard.

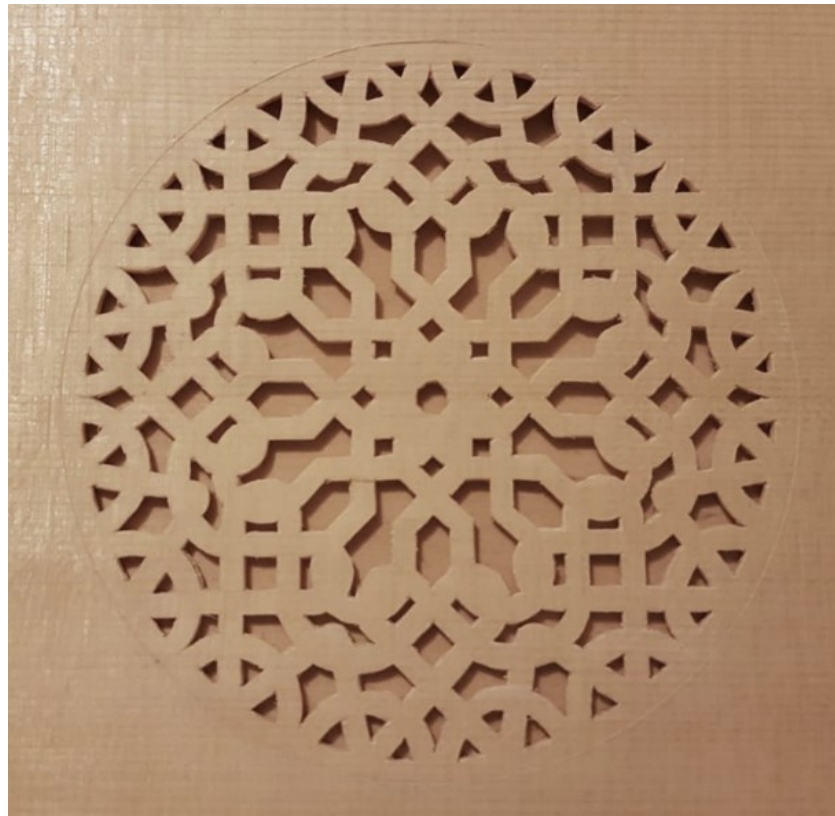
After the initial cuts were done, a chisel-like 0.45mm thick blade was used to cut through the entire thickness of the soundboard, thus removing the desired section of the pattern. A variety of sizes of this kind of blade were used for the different cut-out sections. The soundboard was always held flat against a board of plywood, to support the rosette whilst applying pressure with the knife.

Once all the cut-out sections of the pattern were removed, the paper of the front was then removed by carefully sanding it down, making sure the soundboard was not sanded or scratched (*Figure 188*), and once the paper was thinned down close to the wood, the remaining paper was removed with a sharp scraper.

The edges of each of the openings and the intersections of the pattern were cleaned out and rectified with a sharp 23° angled blade.

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<sup>424</sup> The disposable blades were often replaced to ensure their sharpness.



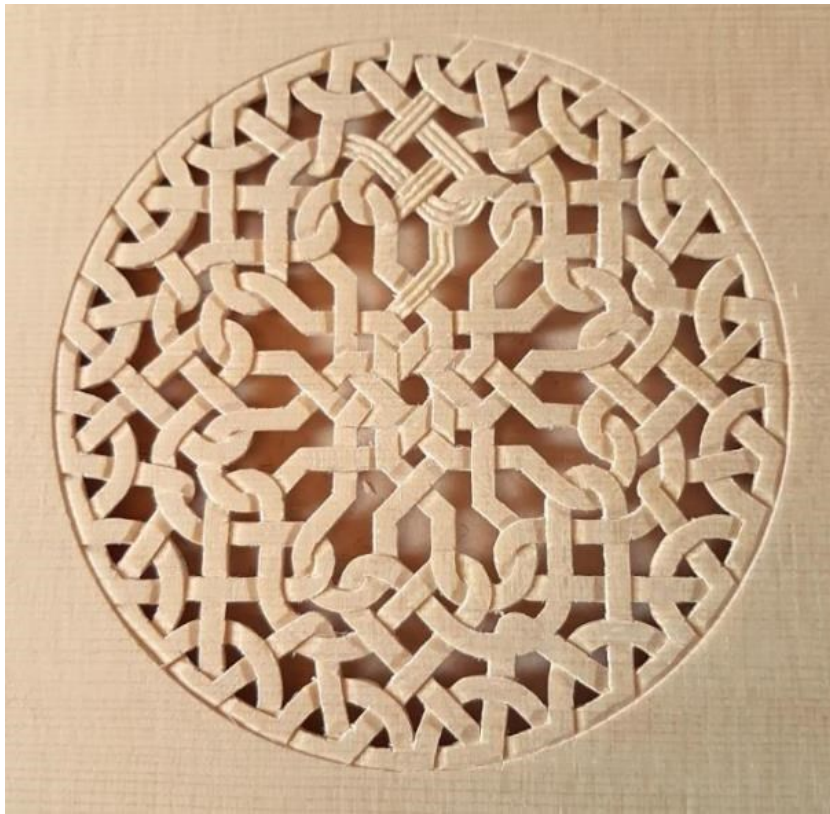
*Figure 188. Carving the rosette.*

The impression of continuity of the rosette as an intertwined infinite knot is achieved by cutting an angled groove on two opposed sides at each intersection of two segments of the pattern, alternating the orientation of the cuts every other intersection, hence producing an ‘up and down’ effect (*Figure 189*).

To carve the decorative parallel grooves that run within the rosette’s pattern, first two straight incisions parallel and equidistant to each other and to the edges of each section were made, making sure to cut only about half the thickness of the rosette. Two further angled cuts removed the material of the borders of each of the initial incisions, creating a sort of “v” shape groove.

It is important to keep in mind the direction of the grain whilst carving the grooves, particularly the sections in which the incisions for the grooves will result in end-grain cuts, leaving small pieces of wood that have a tendency to break or split.

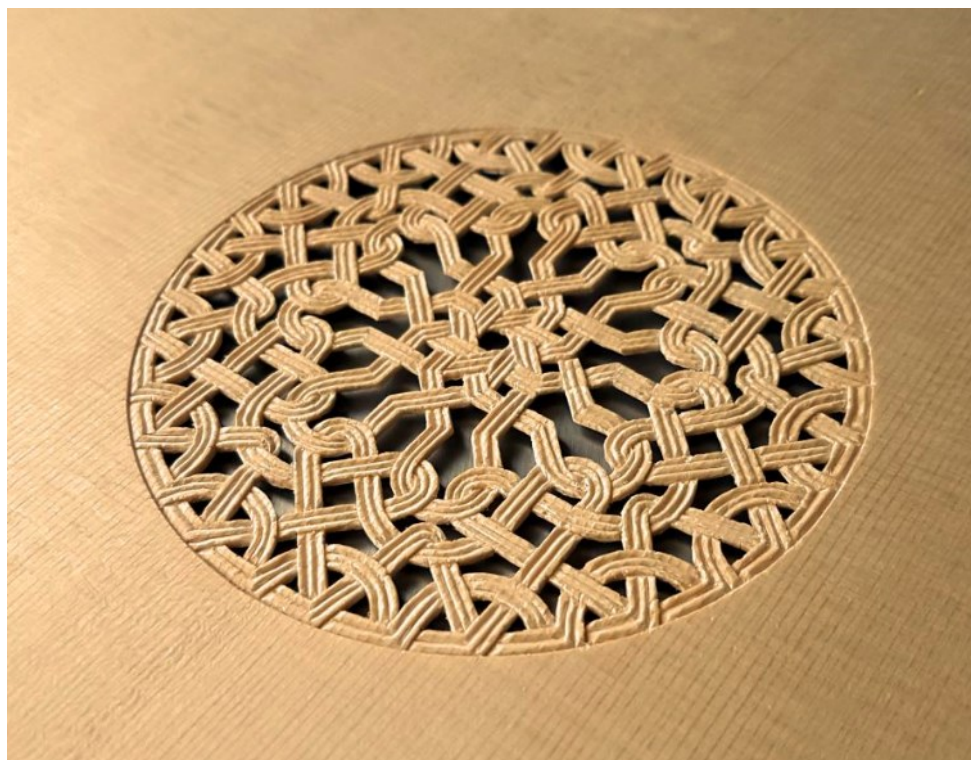




*Figure 189.* Rosette after carving the grooves to produce the up-and-down effect of the pattern.

All the edges of the pattern were once more rectified with the sharp angled blade, making sure to achieve an impression of continuity between all its lines. Deliberately, no ruler or precision device was used to ensure the lines were actually straight. Every cut was made with a single strike of the blade and no sanding or filing was employed. The strong geometric symmetry of the rosette pattern can appear somewhat mechanical and overwhelmingly impersonal; it is the small irregularities in the carving of the rosette that deliver a strong human element of artistic and aesthetic sense of unity. The traces of human imperfection somehow deliver an enhanced perception of the complexity and the craftsmanship involved in carving such an intricate pattern out of a thin fragile sheet of wood (Figure 190).





*Figure 190. Finished rosette.*

The decorative inlays were reproduced in size and shape from the original instrument. Due to ethical and legal implications it was decided to use bone rather than ivory or mother of pearl. First two pieces of bone were thinned down flat to approximately 1.4mm and glued together with a sheet of paper in between,<sup>425</sup> which would allow the working of both inlays at the same time. The heart shape was sawed off with a scroll saw and detailed with fine-tooth files. Subsequently the outline of the bone heart was transferred to two pieces of ebony also 1.4mm thick, and the heart-shaped bone pieces were inlaid into the ebony. A contour was traced 1.5mm from the heart inlay and the excess ebony removed with a scroll saw and then finished with fine files. The bone-ebony hearts were inlaid into the soundboard at their pre-established locations. The remaining decorative ebony element was inlaid at the bottom of the

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<sup>425</sup> The layer of paper, because of its hygroscopic nature, will ease, separating the two pieces once finished by submerging them in water.

soundboard just below the upturned heart to form the decorative spade-shape element.



*Figure 191. Decorative inlay on the soundboard.*

The outline of the lute was transferred to the soundboard with a marking knife following a template; the extraneous material outside the outline of the soundboard was removed leaving an external contour of approximately 2mm around the outline and 10mm extra on the section overlapping the neck. This spare material was left to provide a small margin of error for possible deformations of the back, as well as to prevent dimensional fluctuations inherent to the material of the soundboard.

The braces reinforcing the soundboard were made of European spruce sourced from the same piece of wood used for the counter-cap. All the braces were radially cut with the growth rings running perpendicularly to their height, and parallel to their base. The blanks were left oversized in height to be adjusted further on.

The location of the braces was traced with a marking knife on the inner side of the soundboard parallel to the centreline, following the pattern determined on the drawing.

The section of the base of the brace which runs on top of the rosette was stained with black ink, thus making it less visually evident from the top. This characteristic has been observed in original lutes and although it is a rather

simple device, it makes a significant difference in the aesthetical impact of the rosette.

The first seven straight braces were glued to the soundboard using a go-bar system. This method clamps the braces in place by exerting downwards pressure with wooden batons. The pressure is created by propping the wooden batons between the top of the brace and a firm ceiling; each baton being slightly longer than the distance between brace and ceiling and therefore bent in tension (*Figure 192*).



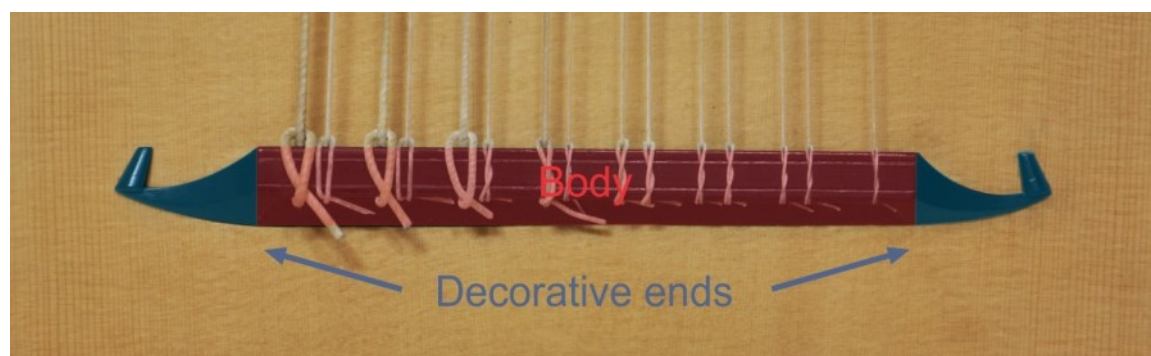
*Figure 192.* Gluing the braces with the go-bar system.

Four additional small braces (2mm wide by 3mm high by 171.5mm (7 Zoll) long) were glued under the rosette to reinforce this section of the soundboard, two on each side and parallel to the brace running through the centre of the

rosette. The bottom section of these reinforcements was also stained in black ink to render it less visually intrusive from the outside. Because of the fragility of the soundboard in the rosette area, clamping these small braces whilst gluing them has to be done without applying too much pressure. Following evidence observed in original instruments of the period, in which the ends of these rosette reinforcements are burnt or scorched, these reinforcements were glued, applying hot glue to the small brace and holding it in place with one hand whilst intense heat was applied to its ends, thus drying the glue underneath the ends to fix the brace in place whilst the rest of the glue dried out slowly.

The braces located below the bridge were not glued at this stage to allow a proper gluing and clamping of the bridge.

The bridge of the lute is a complex geometric solid figure, it can be divided into three sections: the main body which is the section that holds the strings, and two decorative ends (*Figure 193*).



*Figure 193.* Parts of the lute bridge.

The main body of the bridge is an irregular hexahedron of trapezoidal base and faces with a rectangular top and deltoid sides. This means none of its sides is parallel to the others. The base lies flat against the soundboard and it is wider on the bass side than the treble. Its rectangular top is angled high to low from the bass to the treble side, and the front forms a slightly obtuse angle with respect to the base.

The bridge was made of pear wood (*Pyrus communis*). This wood's characteristics are straight grain with a very fine uniform texture and a homogeneous consistency. From a structural perspective, pear wood has a low modulus of elasticity (7.80 GPa or 1,131,000 lbf/in<sup>2</sup>)<sup>426</sup>, and a high modulus of rupture (83.3 MPa or 12,080 lbf/in<sup>2</sup>).<sup>427</sup> That is, it is quite elastic but also very resistant. These characteristics make it suitable for the transmission of sound as well as ideal for withstanding the constant tension and compression exerted by the strings.

First a piece of wood was worked into a rectangular prism blank whose base and front sides equalled the desired maximum width and height of the finished bridge as projected, making sure all of its sides were planed down straight and to square angles. The transversal centreline was marked with a knife, thus providing a clear reference point for all further measuring.

A line was marked in the front; running parallel 2mm from the top. The string holes were marked onto this line with an awl, using the centreline as the reference to establish their precise location. The bridge was placed on a previously made rig that provided a solid platform to drill the string holes at the precise angle. The perforations were made with a column drill, using a 1mm bit for the first four courses, 1.5 and 1mm<sup>428</sup> for the fifth, 2 and 1mm for the sixth and seventh, and 2.5 and 1.5mm for the eighth course. The perforations for the lower courses were drilled slightly below the marked line to allow for the difference in thickness of the strings.

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<sup>426</sup> Measures obtained at <http://www.wood-database.com/lumber-identification/hardwoods/pear/> consulted on 27/03/2016.

<sup>427</sup> The modulus of elasticity or MOE measures how easily a wood will bend (the higher the number, the more stiff it is). The modulus of rupture or MOR measures how easily the wood will break (the higher the number, the harder it is to break).

<sup>428</sup> Bass and treble strings correspondingly.



The next step was to create the angle of the back. This angle is obtained by marking on the top a parallel line to the front demarcating the width of the top, and a diagonal line on the base indicating the different widths of the body of the bridge at the bass and treble sides. The material between those lines is removed with a plane, leaving a flat surface with the desired angle (*Figure 194*).



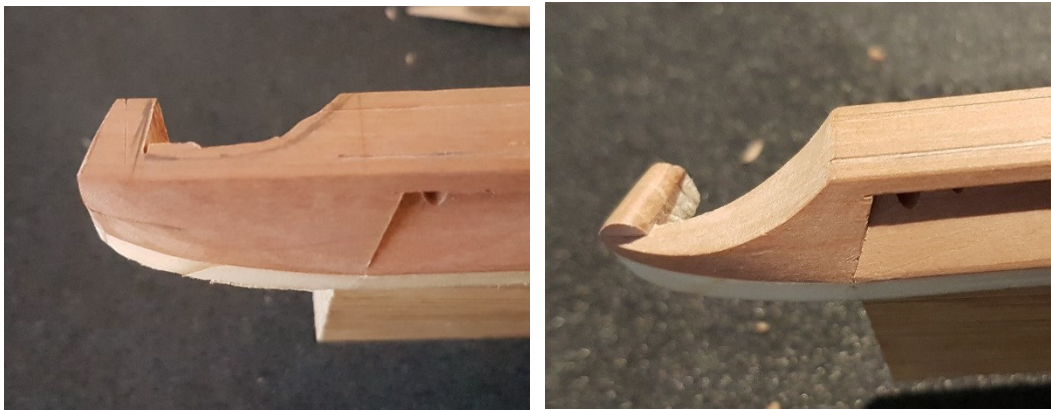
*Figure 194.* Making the bridge.

The depressed re-entrant section of the back which frames the strings is the next to be carved out. First a line roughly 1mm above the upper ends of the string holes is cut with a sharp knife, trying to maintain the knife at a square angle to the surface of the back and extending approximately 3mm beyond to the first and last holes. Two additional cuts are made, one at each of the ends of this line running diagonally outwards from the end of the line to the bottom of the back, forming a trapezoidal shape. The material within this trapezium is removed also at an angle, going from practically not removing anything at the bottom, to about 3.5mm at the top. This removal of material creates enough room to provide the strings with an extra angle to remain securely anchored when in tension.



A similar section is removed on the front but the sides of the trapezium are significantly less angled and only about 1mm of the thickness at the top is removed.

The decorative ends are carved out next. Each of these can be divided in two elements; a curved slope and an angled scroll. Because of the sculptural nature of this section of the bridge, all its curves are carved freehand, following only loosely the lines of the drawing (*Figure 195*). Due to their fragility and because their carving involves the removal of a significant amount of material, the base of the bridge was lined with paper and glued to a base of  $\frac{1}{4}$  inch plywood to provide a stronger support whilst carving. The plywood base was glued then to a shorter and taller piece of wood to allow it to be clamped to a carving vice.



*Figure 195.* Carving the decorative ends of the bridge.

Two decorative lines run on the top of the bridge parallel to the front and back, these are not carved but indented by running a blunt marking tool against the edge of a ruler whilst applying pressure.

Once the carving was finished the bridge was ebonized. To achieve a satisfactory deep dark colouring first the bridge was coated with tea,<sup>429</sup> once dried it was sanded down with a fine grit sandpaper to remove the wood fiber

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<sup>429</sup> Common black tea brewed for ca. 5 minutes to obtain a strong tannin solution.

raised due to the moisture introduced. Then a solution of iron wool and white vinegar<sup>430</sup> was applied, and it was followed by a further coat of tea to increase the tannic acid. This produces a reaction that results in a rich black coloured wood (Figure 196). After a final sanding, the bridge was covered with a layer of shellac to protect it from the elements.

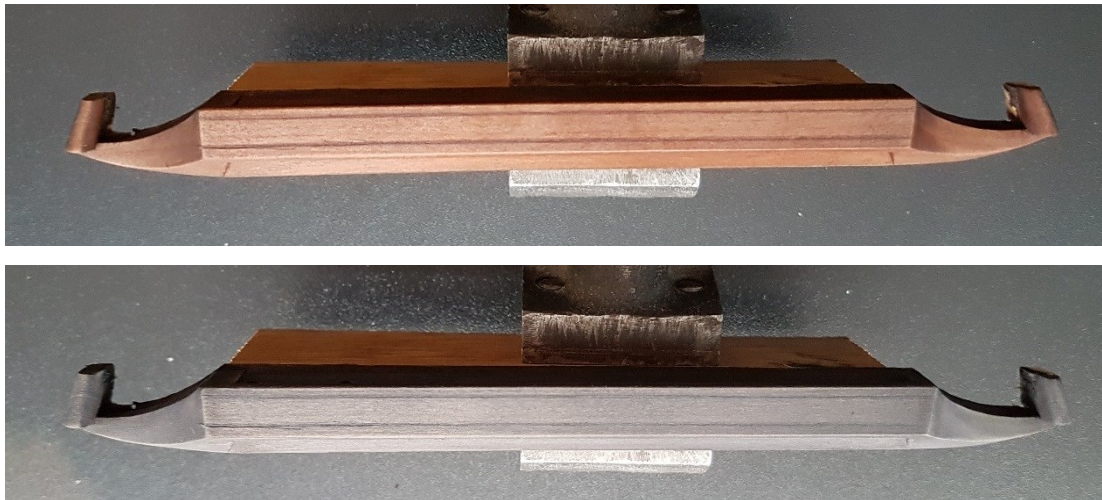


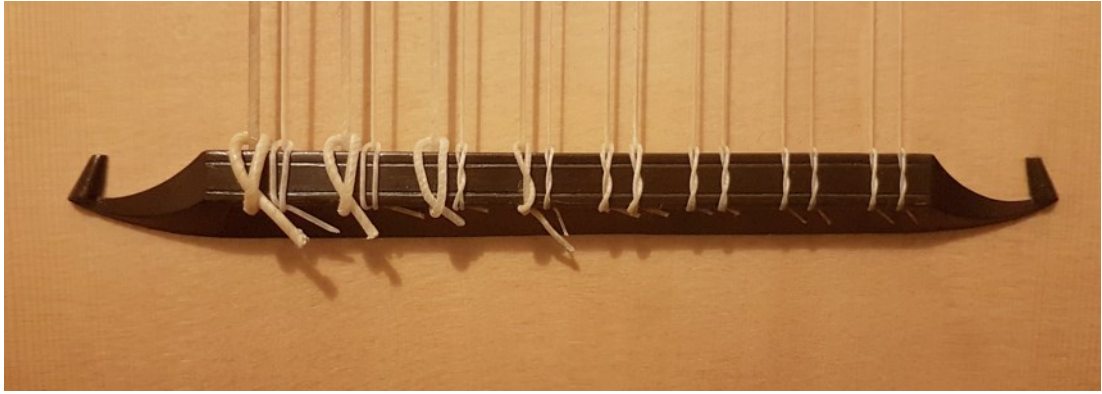
Figure 196. Ebonizing the bridge.

Once dry, the bridge was removed from the supporting base by introducing moisture to the paper glued to its base and allowing it to seep through. Subsequently a thin spatula was carefully inserted between the bridge and the plywood and run across the length of the bridge, thus releasing it; the remaining paper was then removed from the base of the bridge by sanding it down on a flat surface.

The precise location of the bridge within the soundboard was determined using the centreline as a reference and marking the angled transversal line indicating the front edge of the bridge body. The bridge was glued to the soundboard, and left to dry overnight.

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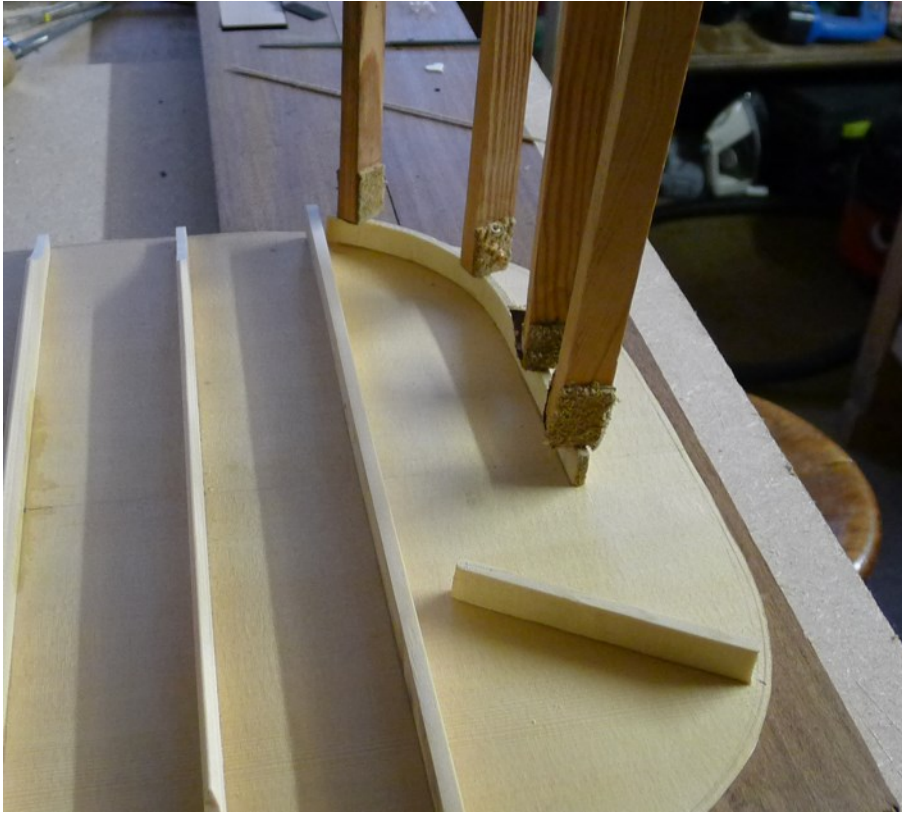
<sup>430</sup> The steel wool was first washed with detergent and hot water to remove any oil, then submerged in white distilled vinegar for two weeks. The solution was then strained to remove any solids.



*Figure 197. Finished Bridge.*

The braces glued below the bridge have a significant impact in the sound quality of the lute. Their shape and size can alter the tonal characteristics, and their location and orientation within the soundboard have a direct influence on the sound response of the instrument.

The bass-bar was made out of the same material as the other braces. To shape the blank of wood to the required curve; it was first submerged in a solution of hot water and acetic acid for two hours and then bent using a hot bending iron to match the desired line. The two small treble bars were also manufactured with the same material used for the braces and cut to size lengthwise. The location of all these bars was marked on the inner side of the soundboard following the drawing. They were glued to the soundboard by means of the go-bar system, and left to dry overnight (*Figure 198*).



*Figure 198.* Gluing the bass-bar.

The height of the braces was adjusted to the desired dimensions, their tops chamfered on both sides, and their ends trimmed down on a curved slope (approximately 35mm long) to circa 5mm high.

The small braces under the bridge or ‘treble bars’ were planed down at an angle from 10mm high (on their end closest to the outline of the soundboard) to circa 3mm and finished with a steep angle chamfer on both sides.

The bass-bar was also tapered down from its outer end at a gradual angle, albeit not as pronounced as the other two small braces (*Figure 199*). Its height, as well as the height of the brace immediately above the bridge, were determined by tapping the soundboard. This process is explained in detail by Lundberg,<sup>431</sup> and although there is no historical evidence of the use of this technique by lute

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<sup>431</sup> Lundberg, 122 – 129.

makers of the period, it produces remarkably good results in relation to the sound of the finished lute.

Tap-tuning or voicing is a construction method to regulate the stiffness and weigh of the soundboard. In order to obtain a good sounding instrument, the thickness of the soundboard has to be brought to the right deflection based on its individual vibration modulus, and the bracing mass needs to be balanced to allow an ideal transfer of the vibrating string energy into sound. Modern instrument makers use acoustic analysis software when voicing and tuning both the soundboard and the back, tuning each of these to a specific fundamental resonance.

For the reconstruction of this lute a more simple approach was used, the soundboard was held between the thumb and middle finger of one hand between the second and third braces (counting from the upper block) and the bridge tapped with the other hand, whilst carefully listening to the emitted sound. Removing material from the top of the braces in the vicinity of the bridge using a small block-plane has a direct impact on the sound produced by the soundboard. To reach the desired 'tone' or 'voice', first the treble bars were adjusted until a bright sharp sound was obtained when tapping the bridge on the treble side, then the bass bar and the brace just above the bridge were adjusted to achieve a deep sonorous vibration whilst tapping the centre and bass side of the bridge.





Figure 199. Adjusting the braces to voice the soundboard.

### The neck

The neck was made of radial cut spruce with the grain running lengthwise and veneered with ebony. There were two main factors taken into account to determine the curve of the back of the neck. First and most important was the ergonomics of it, as the hand of the musician will be in constant contact with the neck, and this has to be a comfortable experience. A too thick or too thin neck will greatly impact the finished instrument's playability.

The neck started as a solid block of spruce, approximately the same dimensions as the finished neck, with a flat base and tapered in thickness and width.

To prepare the joint of the neck with the body, the width of the neck was transferred into the block, and its thickness to the upper end of the back. This angled line was then sawn off with a handsaw and finished with a block plane.

The removed section of the block determines both the angle of the joint and the shape of the curve of the back of the neck at the body joint. These are transferred to the blank of the neck, the corresponding section at the joint removed, and the back of the neck carved, leaving the curve approximately 1mm smaller than the desired final dimensions to account for the ebony veneer to be applied. As the neck tapers down both in width and thickness towards the pegbox, the curve follows an organic arc close to a semicircle (*Figure 200*).



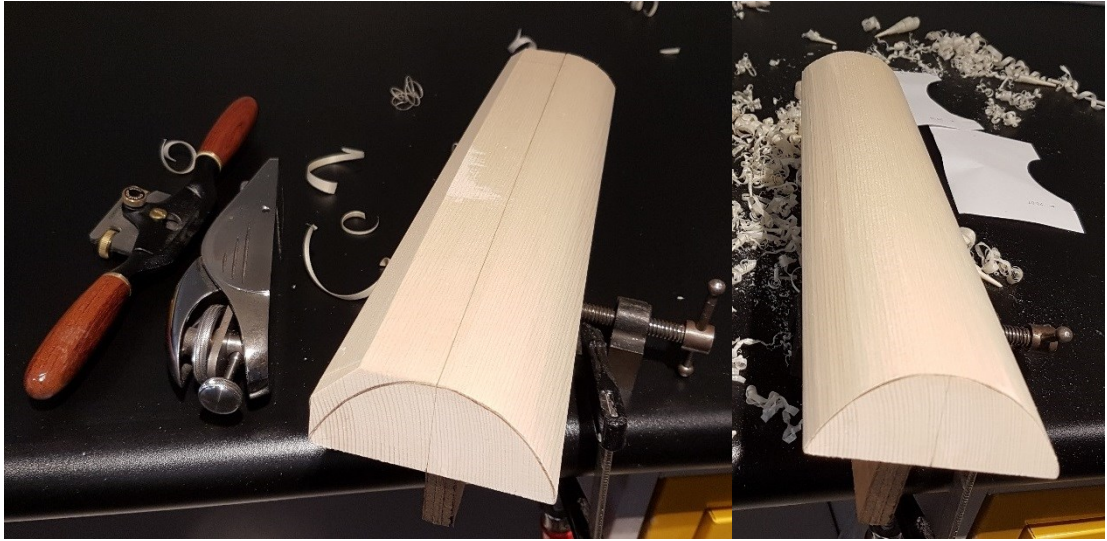


Figure 200. Shaping the neck.

The ebony veneer was glued to the back of the neck applying the glue to the spruce neck core, and heating the veneer with a hot-air gun to facilitate its shaping to the neck. To clamp down the veneer and neck they were both tightly wrapped around with a cloth and an elastic band (*Figure 201*).



Figure 201. Veneered neck.

To prepare the neck for the joint, the gluing end was sealed with thin glue. Subsequently, both gluing surfaces of the neck and the body were rectified, the axis of the neck adjusted to match the centreline, and the angle of the neck verified with respect to the soundboard. This is paramount, since it will greatly affect the string action and therefore the playability of the lute. Minor adjustments can be achieved afterwards when fitting the fingerboard, but there is very limited room for error at this stage.

As the neck-joint is an angled surface, two small stoppers were lightly glued to the block, thus preventing the neck from sliding whilst gluing. Once glued and dry, the joint was reinforced by driving an iron nail through the block into the neck, as observed in the original instruments. A pilot hole was drilled beforehand and the nail was heated until bright red to ease its way and to avoid the wood from splitting, then it was hammered in (*Figure 202*).



*Figure 202.* Driving the iron nail into the block.

### **Closing the body**

The soundboard was attached to the body, making sure its centreline was aligned with the centreline of the back. The braces were trimmed in length to fit inside the back without touching the ribs, leaving a small gap to account for the unavoidable shrinkage of the soundboard over time, thus preventing future damage to the ribs and the soundboard.

To glue the soundboard, first the section overlapping the neck was glued and clamped down, then the rest of the soundboard was glued to the edge of the back, starting at the block and progressing towards the bottom. It was clamped

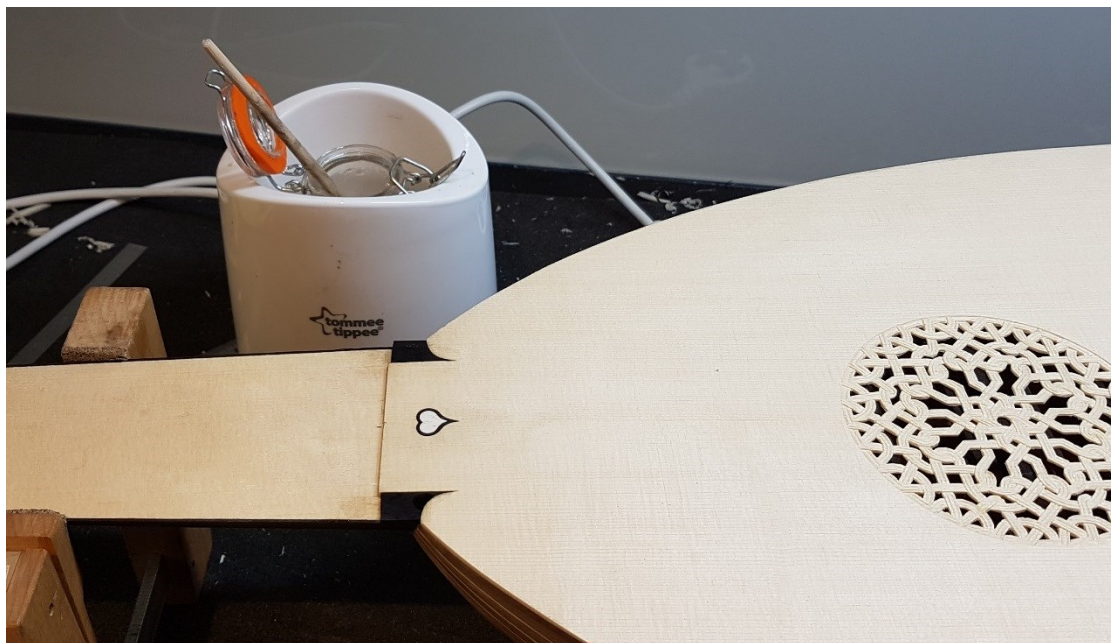


using only stretched pressure-sensitive adhesive tape (*Figure 203*). After drying, the protruding border of the soundboard was removed with a sharp chisel.



*Figure 203.* Gluing the soundboard.

The fingerboard points were made of ebony, the two points were glued to each other (with a layer of paper in between) to be carved together, thus ensuring they were identical. Once finished, they were separated and inlaid to the soundboard. The extraneous material of their sides was trimmed off and their upper end adjusted to achieve a straight line with the end of the soundboard (*Figure 204*).



*Figure 204.* Inlaying the fingerboard points.

The fingerboard was made with a single piece of ebony. The blank was left slightly wider and thicker than the finished dimensions to allow for further adjustments. The length was trimmed precisely, making sure the line with the soundboard and the fingerboard points made a clean and snug joint, and the other end matched the pre-established string length.

To glue it to the neck, both parts were lightly heated with a hot-air gun to allow for a better glue flow. Then the fingerboard was glued to the neck and clamped using a flat clamping block, making sure the joint with the soundboard was precise since the glue acts as a lubricant and wide gluing surfaces tend to slide when applying pressure (*Figure 205*).



*Figure 205.* Gluing the fingerboard.

Once dry, the overhanging material of the sides was trimmed out, leaving a smooth round edge to transition to the back of the neck. This edge will impact greatly on the comfort of playing this lute; a too sharp end will be rather

uncomfortable, whilst a too round edge leaves less room for the string when pressed against the fingerboard, additionally it has a negative aesthetical effect.

The thickness of the fingerboard tapers down from the nut to a flush end against the soundboard. Removing material on the top or the bottom allows us to adjust the action of the strings. To do so, a nylon thread approximately the same gage as the first string is attached to the bridge, and held at the end of the fingerboard whilst applying a little tension; the action can be measured and adjusted by removing material from the fingerboard until achieving a comfortable string height at the body/neck joint.

To install the binding, first an incision 1mm deep was cut 2mm from the edge of the soundboard. The wood outside this line was removed to half the thickness of the soundboard, leaving a clean 90° step from the border (*Figure 206*). The bind was made of two pieces of ebony pre-bent to shape with a bending iron at 180°C, and joined at the centreline of the soundboard.



*Figure 206.* Inlaying the binding.



## The pegbox

The pegbox was made of sycamore (ebonized following the same technique as described for the bridge in page 275), with the back made of a solid piece of ebony, all its parts glued with simple butt-joints (*Figure 207*).

The peg-holes were drilled using a drill press; the pegbox was held on an angled jig purposely made to ensure the centreline of the pegbox was parallel to the base of the drill press. A block of wood of the same dimensions as the inner void of the pegbox was fitted in place to avoid wood tearing on the drill-bit exiting the walls. The peg-holes were pre-reamed<sup>432</sup> roughly to the desired diameter at this point. The lower end of the pegbox was finished to the pre-established angle and rectified to ensure a flat gluing surface. Due to the construction of the pegbox, the wood of this section is exposed end grain, therefore, to ensure a proper adhesion of the joint, it was sealed with thinned down hide glue, left to dry, and rectified.



*Figure 207.* Pegbox before gluing to the neck.

To glue the pegbox to the neck, the dimensions of the base of the pegbox were transferred to the end section of the back of the neck; then the material of the neck was sawn off, flattened, and adjusted to accurately fit the pegbox. The

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<sup>432</sup> Herdim®, peg reamer for lute (straight edges, uncoated).



pegbox was glued to the neck using an angled jig to clamp it in place, and left to dry overnight (Figure 208).



Figure 208. Gluing the pegbox.

The pegs are made of *lignum vitae*: although there is no evidence of its use historically, the characteristics of this wood make it ideal for pegs. *Lignum vitae* has a combination of extraordinary strength and density, as well as self-lubricating properties, which is why it has been historically used for the construction of movable parts in machines like clocks, as well as ship's propeller bushes and bearings. Pegs made of this wood should be very durable and provide a smooth tuning of the strings.

For the design of the pegs it was decided to use the model most prevalent in iconography (Figure 33), a simple round-shaped head with a single ring collar at the intersection where the head meets the shaft. This model is both visually pleasant and functional.

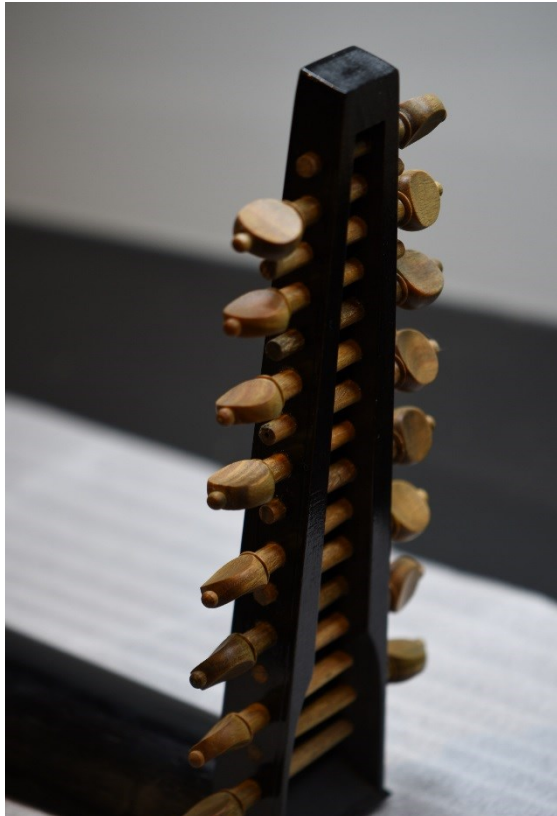


Figure 209. Finished pegs.

The pegs were turned by hand on a wood-lathe, all of them the same size and shape; the shafts were turned conically but were left slightly thicker than the desired final diameter. The final adjustment of the shaft was made by hand with a peg-sharpener.<sup>433</sup> The sides of the heads were chiselled down and finished with a fine file. All the pegs' heads and the upper section of the shafts were coated with beeswax and polished. Once adjusted in the -was cut to size and a hole was drilled to the shaft approximately 10mm from

the pegbox wall nearest to the peg head. The edges of the hole were smoothed with a countersink to avoid damaging the strings (*Figure 209*).

The nut was made of bone, the string grooves precisely measured, and incised using a fine round file until the desired string height at the fingerboard was achieved. This height will have a direct impact on the playability of the lute: if too high, the strength necessary to stop the strings will be increased and the tuning will also be affected; if too low, there is a risk of the strings rattling against the frets or the fingerboard, causing unwanted noise.

Once the string height was achieved, the nut was finished with fine sandpaper, making sure to avoid any sharp edges in the string grooves and the edges

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<sup>433</sup> Herdim®, peg shaper for lute.

which could be in contact with the musician's hand, then coated with beeswax and polished. The nut was not glued to the neck, but was held in place by the tension exerted by the strings.

### Finish

The back and the soundboard were finished only with a sharp scraper, no sand paper was used to prevent the pores of the wood getting clogged. The scraper cuts the grain neatly leaving a smooth and sharp finish. The soundboard was coated with a light layer of beeswax and carnauba wax dissolved in natural turpentine. The back was rubbed with isopropanol, which reacts with the natural resins of the *lignum vitae* leaving a very smooth, waxy finish. Then it was coated with oil-based varnish (Figure 210).

Oil varnishes were widely used during the Renaissance; artists, cabinet makers, and instrument makers throughout Europe used amber-based oil varnishes often produced in Germany. These varnishes produce a beautiful, transparent, warm and resistant film.



Figure 210. Back after the first coat of varnish.

The neck, fingerboard and the back of the pegbox were finished with a fine sand paper and honed with steel wool, then coated with several applications of

Tung oil. The sides and top of the pegbox were stained and covered with a light coat of beeswax.

### The strings

Renaissance lute makers would design and create a lute to play a specific note at a desired pitch according to the strings that were available in the market; this reverse engineering project resulted in an inverse scenario. The string length was determined based on geometrical and historical calculation, and it is with the finished instrument that the stringing will be deduced. Following Praetorius' ideas, the size of the instrument and its string length are appropriate for an 'Ordinary Alto lute', <sup>434</sup> which he suggested should be tuned in g.

In his illustration of the alto lute (*Figure 7*), Praetorius provides a ruler, and using that as a reference, the string length can be measured as 61cm approximately. Taking that as a reference for a lute tuned in g, the reconstructed lute with string length of 64.85cm should be tuned in f#.

The strings were acquired from a supplier of gut strings made following historical techniques.<sup>435</sup> The diameter of the strings was calculated with the following parameters:<sup>436</sup>

<b>Pitch</b>	A= 440 Hz <sup>437</sup>		
<b>String length</b>	648.5mm		
<b>Density of material (gut)</b>	1246 Kg/ml		
<b>Course</b>	<b>Note</b>	<b>String tension (Kg)</b>	<b>Diameter (mm)</b>
<b>1<sup>st</sup></b>	f#'	3.4	0.38

<sup>434</sup> Praetorius, 51.

<sup>435</sup> Aquila Corde Armoniche srl.

<sup>436</sup> Calculated using Arto's string calculator suggested by Aquila strings, at <https://www.cs.helsinki.fi/u/wikla/mus/Calcs/wwwscal.html>, consulted on 18/02/2017.

<sup>437</sup> According to Ephraim Segerman in his article "Praetorius's Cammerthon Pitch Standard", *The Galpin Society Journal*, Vol. 50 (Mar., 1997), 90.

<b>second</b>	$c^{\# '}$	3.3	0.50
<b>third</b>	$g^{\#}$	3.03	0.64
<b>fourth</b>	$E$	3.0	0.80
<b>fifth</b>	$b - B$	3.05 - 3.05	0.50 - 1.08
<b>sixth</b>	$f^{\#} - F^{\#}$	3.02 - 3.0	0.70 - 1.4
<b>seventh</b>	$c^{\#} - C^{\#}$	3.1 - 3.0	0.97 - 1.9
<b>eighth</b>	$B - B'$	3.1 - 3.2	1.08 - 2.2

Gut frets were tied to the neck following Tomas Mace's instructions:

The way to tye on a fret the best way, is thus; viz. your lute standing (as it were) before you upon a table, upon its back, take your fret, and put it double, under all the strings, beginning from the basses, towards the trebles; then (putting your left hand under the neck) take that middle double, and draw it under the neck towards the basses, (holding fast the two ends in your right hand) till you have brought them together, (viz. the middle nooze, and the two ends). Then take that end next you, which you held in your right hand, and put it through that nooze, so, that you make another nooze of that end, and then let the first nooze go.

Then again, take but the other end, which still remains in your right hand, unused, and put it through your last nooze, taking the ends, (in each hand one) and let all else go, and (only drawing them straight) your business of tying is over.<sup>438</sup>

Four different gages of gut were employed for the frets: 1.1, 1.0, 0.9, and 0.8mm, decreasing in size every two frets towards the body of the lute. This system prevents the string from rattling against the previous fret whilst being stopped with the finger. The positions of the frets within the fingerboard were calculated using the twelfth root of two method.

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<sup>438</sup> Mace, 69-70.





## Conclusions

Sixtus Rauwolf was born into a middle class family during a period of cultural and religious upheaval, in a city which was at the centre of conflict as well as the source of funds and influence that changed the world. The materials employed by Rauwolf for the construction of lutes provide a picture of international trade of exotic woods and precious materials (like ebony, lignum vitae, ivory, and mother of pearl), coming from Africa, India, and America through Venice, and across the Alps to Augsburg where craftsmen would put them to use for the production of luxury items. Augsburg, an imperial city of the Holy Roman Empire, home to some of the wealthiest and most powerful families of the Renaissance in Europe (known to be generous patrons of the arts and international traders) was undoubtedly an intellectual centre of culture and art, where music thrived and instrument makers supplied the demand for musical instruments.

Although this project is by no means the first attempt to reconstruct a late-Renaissance lute with historical foundations, it is indeed the first to recount the thought process from the research and conceptualization to the finished physical object, without attempting to be a one-fits-all solution. Instead, focusing attention on one particular lute maker, with a relatively manageable corpus of extant examples, allowed an in-depth study, providing an insight to his design and construction ideas. Comparing the materials, shapes, proportions, and decorative elements involved in the manufacture of his instruments enabled me to build up the essential knowledge to individuate Rauwolf's work in comparison to the contemporary lute makers in Italy and the rest of Europe. This thesis is the first to document the life and work of Sixtus Rauwolf, and puts it in perspective with Augsburg during the Renaissance within the guilds system.

Active as a lute maker from 1577 to ca.1625, Rauwolf worked during a period in which the lute went through several modifications, including a constant

development with regard to the number of courses. Since none of the extant lutes by Rauwolf known at present survives in original condition, it is impossible to establish with certainty how many courses each of them had when originally conceived, though it is plausible to assume his lutes and ideas followed the development as well. Most likely Rauwolf's early career lutes were designed and built as six- or seven-course instruments, increasing chronologically to eight by the last decade of the sixteenth century, and nine or ten courses by the end of his productive life.

The only historical reference describing a lute by Rauwolf in which the number of strings is mentioned dates from 1585; it lists two lutes with 16 strings each, in all probability eight double courses. This reference appears only four years after the first known written reference to a lute with those characteristics. It is likely that although there was an evident coexistence of lutes with six, seven, and eight courses at the time, Rauwolf, and probably other makers in Augsburg, were producing lutes that would meet the requirements of the latest musical trends.

Similarly, from the design standpoint, whilst lute-making schools and workshops in Italy favoured one particular lute model, Rauwolf had different models overarching the two main trends in vogue, probably to satisfy a more diverse demand for lutes in a city known as an international trade and cultural centre.

A remarkable outcome of this study is the realization of a particular measuring unit employed by Rauwolf—either purposefully or by an unintended flaw of his measuring device, yet consistent throughout his work. The use of this unit, the 'Rauwolf zoll', offered a valuable tool in understanding and deconstructing the process behind the geometry and proportion of the lines and curves of Rauwolf's designs. Comparing the outlines of all his extant lutes demonstrated that although he built lutes of different sizes, as was customary at the time, their

design follows a coherent geometrical construction, based on proportions and specific measurements.

The impact of a thorough research has been remarkable in the outcome of this project. A sound confirmation of this statement is a previous instrument built by the author based on Rauwolf's 1596 lute. The lack of knowledge with regards to the measuring unit used by Rauwolf, the evidence found about the number of courses on Rauwolf's recorded instruments, and even the string length and position of the bridge defined by scholars of the period, resulted in a vastly different instrument than the one built as a result of this project. (Figure 211).



*Figure 211.* Two lutes based on Rauwolf. Left: lute after Rauwolf's 1596 lute (finished in 2013), Right: lute built during this project.

The comprehensive study of Rauwolf's work, together with cross referencing the gathered information of the extant lutes with historical sources, allowed a plausible reconstruction of a lute as originally intended by Rauwolf. Whilst

producing a detailed technical drawing of the theoretical prototype of Rauwolf's lute enabled an insightful understanding of the creative process and made evident the challenges and interrogatives posed by the unknown elements of Rauwolf's designs, the physical reconstruction of the lute embodies a material outcome of the answers achieved.

The reconstructed lute is not only aesthetically pleasing, but also a functional musical instrument of a rather high quality.<sup>439</sup> According to professional lute players who had the opportunity to try the instrument, its sound is warm with very good projection and sustain, and its timbre is quite equilibrated throughout the courses. From the playability standpoint it has been praised as a "very comfortable instrument, and highly responsive".<sup>440</sup>



*Figure 212. Gordon Ferris playing the finished lute.*

Having a double first course is not common nowadays, and the experience of playing a lute with that particular characteristic was somewhat ambivalent. In some cases it was considered 'interesting' and even 'pleasing', but in others it

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<sup>439</sup> Audio visual examples of the finished instrument being played are included as digital files in a DVD inside a sleeve attached to the inside back cover.

<sup>440</sup> Gordon Ferris, informal conversation, 2017.

was not well received, which in some way corroborates the idea that today – just like in the sixteenth century – the musical trends and the performing musicians determine what the successful traits of an instrument are.

The publication of this reconstruction process together with a detailed technical drawing represents a valuable resource for lute makers. It provides the necessary information to reconstruct a historically informed Renaissance lute from Augsburg as made by Sixtus Rauwolf.





**Photos of the finished lute**



*Figure 213. Front view.*



*Figure 214. Three quarters view.*





Figure 215. Back.



Figure 216. Bottom.

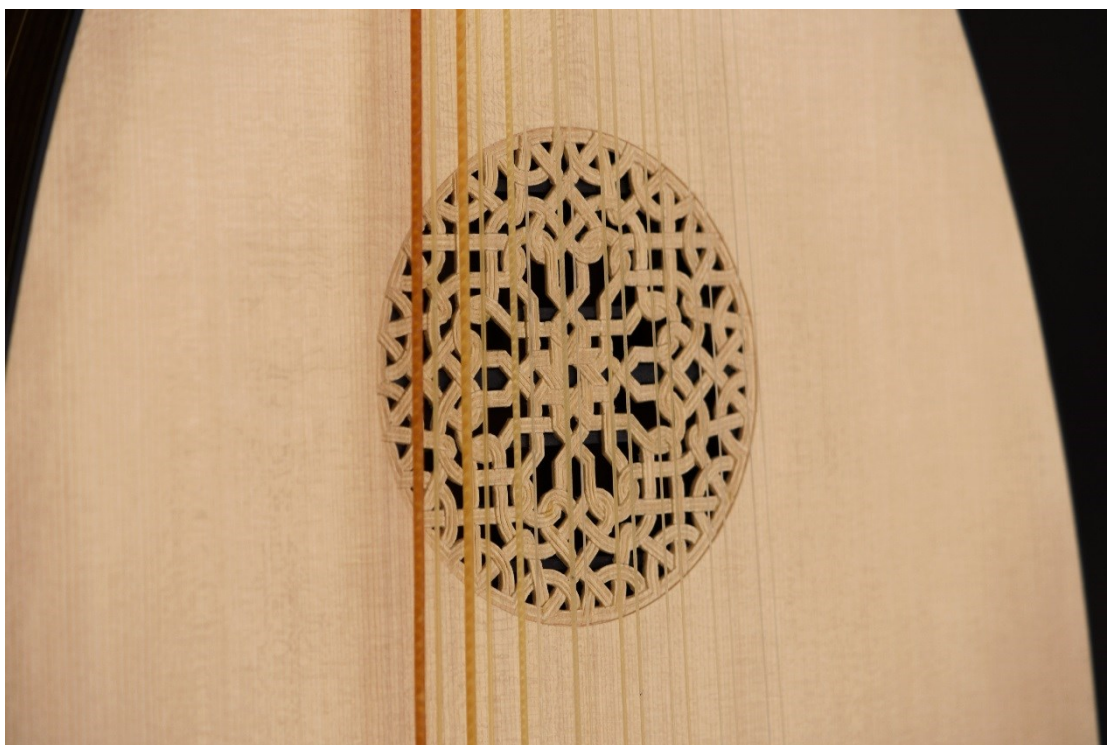


Figure 217. Detail of the rosette.

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